

Chapter 2 — Affected Environment

Planning Area Profile

The resource management plan planning area (RMP area or planning area) includes all of the Lakeview Resource Area (LRA) except for approximately 31,000 acres of the resource area managed by the Burns District. The planning area also takes in 2,172 acres of the Surprise Resource Area of the Susanville District in Nevada for which the LRA has management responsibility (Map I-1).

This chapter describes the current condition, amount, location, use, and demands etc., of each of the resources in the planning area that could be affected by the actions described in Chapter 3.

History of the Resource Area

Indigenous people have lived in what is now the LRA for thousands of years. Native American Tribes and individual members continue to use these lands today for traditional cultural practices, such as plant gathering and hunting. Europeans first entered this area in 1826, when Peter Skene Ogden of the Hudson Bay Company crossed the area while exploring the Great Basin. John C. Fremont, representing the United States Government, explored the area in 1843. Fremont's explorations were published and widely read in the United States, creating an interest in the West (Fremont 1956). However, because of the dry conditions, rugged environment, and lack of farmable land, much of the Great Basin was ignored. It served only as a transportation route for early settlers heading to California and Oregon. The Oregon Central Military Road, which was used to transport supplies from Eugene, Oregon, to Fort Boise, Idaho, was created in 1867. While little used, it began to open up to development what would later become Lake County.

In 1866, the military established the first Camp Warner on what is today Hart Mountain. The camp was later moved to a location west of Warner Valley in order to provide settlers and travelers protection from the Northern Paiute Indians. Oregon became a state in 1859, when several transportation routes were bringing large numbers of settlers into the State. In 1867, the first settlers entered the Goose Lake Basin and soon began settling throughout the region. New Pine Creek, Oregon, the oldest town in Lake County, was established in 1869. Lake County was established by State legislature in 1874. At that time, it included what is

presently Klamath and Lake Counties. The site that was to become Lakeview had its first residence built in 1872 and was selected as county seat in 1876.

The decades of 1870 and 1880 saw the settlement of much of the region and the establishment of towns throughout the area. The main focus of settlement and economic development was ranching and livestock. Logging became a major focus in later years. Towns and villages such as Paisley, Summer Lake, Silver Lake, Fort Rock, Adel, and Plush served as trade, supply, and civic centers for the ranches and homesteads that developed. Lands occupied were primarily within the rich valley basins and river bottoms of the area. The rest of the land was used primarily for open range grazing and harvesting trees for lumber. To a limited degree, mining also helped focus attention on the area.

In the early 1900s, there was an occupation boom in the Fort Rock and Christmas Valley area. Between 1902 and 1912, nearly all the available land within these areas was homesteaded. For a few years, these settlers were able to work and make a living with dry land farming techniques. However, when rainfall diminished, the farms failed and were abandoned. Where there had once been 18 post office locations, only two survive today at Fort Rock and Christmas Valley. The communities of Lakeview, Paisley, Silver Lake, Fort Rock, Summer Lake, Christmas Valley, Adel, and Plush remain the centers of civic life in the region, with Lakeview being the largest community in the county. Other locations, especially in northern Lake County, have disappeared from the map.

Physical Characteristics

The LRA lies in the northwest portion of the Great Basin. Traditionally, this area has been placed within the Basin and Range Physiographic Province, which is bordered to the north by the High Lava Plains Physiographic Province. Consequently, the planning area displays the characteristics of both provinces. Anderson et al. (1998) divides the planning area into three divisions: High Desert, Klamath, and Mazama Provinces. This division is based on physiography, geology, and soils. Over 75 percent of the planning area is classified as High Desert Province. The rest of the area is classified Klamath Province (18 percent) and Mazama Province (7 percent).

Physiography

The geology of this part of the Great Basin is characterized by uncompacted stream- and lake-deposited sediments and a variety of volcanic and sedimentary rocks. Some scientists estimate that these sediments and rocks range in age from early Oligocene (38 million years ago) to Holocene (recent). They have been displaced and broken-up by Miocene- to Pleistocene-age (15 million to 11,000 years ago) faults. This has resulted in the north- to northwest-trending mountains and valleys characteristic of this area. These ridges and valleys are divided crossways by a dominant northwest-southeast trending fault system, and a northeast-southwest trending fault system. All watersheds in the planning area are internally drained, which is characteristic of the Great Basin. However, in the geologic past, Goose Lake spilled into the Pit River, which eventually reaches the Pacific Ocean.

Many of these undrained basins contain saline playa lakes and large accumulations of alkali. The relatively young volcanic eruptions of the High Lava Plains Province is responsible for some of the outstanding volcanic features found in the RMP area. Lava flows, volcanoes, cinder cones, lava tubes, and explosion features occur throughout the RMP area, with the youngest of these in the Christmas Valley/Fort Rock area.

The entire resource area is placed by some scientists within the limits of Mesozoic (240 to 66 million years ago) and Paleozoic (570 to 240 million years ago) marine sedimentary basins. Significant accumulations of hydrocarbon-bearing marine sediment may lie beneath the younger volcanic and volcanic-derived sedimentary rocks in some areas.

The elevation in the RMP area ranges from 4,103 feet at Summer Lake to 8,456 feet at Crane Mountain.

Climate

The planning area has a semiarid climate with long, cool, moist winters and short, warm, dry summers. The average annual precipitation is between 8–18 inches, depending on elevation, with the majority of moisture coming in the winter and spring. Temperatures can range from below 0 degrees Fahrenheit in the winter to more than 90 degrees Fahrenheit in the summer. Average monthly temperatures range from 28.7 degrees in January to 62.5 degrees in July. However, freezing temperatures can occur any time of the year. Climatic data from elsewhere in the northern Great Basin and southeastern Oregon indicates that 7 out of 10 years in

the past have been affected by drought (BLM 1998g).

Plant Communities

Shrub Steppe

Ecological Provinces and Subbasins of Southeastern Oregon

Introduction

Four hydrologic subbasins, as defined by the U.S. Geological Survey (USGS) in the RMP area, are centered around (1) the Paulina Marsh and Silver Lake (Silver Lake Subbasin), (2) the Chewaucan Marsh drainage into Lake Abert (Lake Abert Subbasin), (3) the Warner Wetlands drainage (Warner Lakes Subbasin), and (4) the Beaty Butte country (Guano Subbasin), which drains into the Guano system. There are also small, Bureau of Land Management (BLM)-administered holdings within the Goose Lake drainage. Remnants of Pleistocene pluvial (glacial melt and rain-filled) lakebeds exist in these four major drainages. The evidence of these extensive inundations exist in exposed shoreline terraces and visible wave-action beach lines. Present-day climate is uniformly dry and cold with frosts that can come any day of the year. Climate varies widely from location to location at any given time, both seasonally and from year to year, even though the climate is generally dry with extremes of cold and hot (Anderson 1998). Pollen records demonstrate that extreme changes can occur rapidly from year to year and that resiliency of species is the norm; predictability is not the norm (Miller and Wigand 1994).

The High Desert Province

The High Desert Province is characterized by large and small closed basins surrounded by extensive terraces formed by ancient lakes. Between the closed basins are low basaltic ridges, hilly uplands, isolated buttes such as Beaty Butte, mountains such as St. Patrick and Warner, and block-faulted igneous formations such as Abert Rim and Poker Jim Ridge. The rainfall varies from 8 inches of precipitation at Plush to 10.2 inches on Hart Mountain; average annual precipitation in this province is 9.7 inches. On the northwest part of this province, the boundary between High Desert and Mazama Provinces is a belt determined by the pumice mantle and/or lava flows from Mazama, Paulina, and other volcanoes (Anderson 1998).

When Europeans came to the High Desert Province, it was occupied by the Klamath, Warm Springs, and Northern Paiute Tribes (Aikens 1986). Today, these Tribal people live in towns, on ranches, or on reservations (Klamath Tribes, Warm Springs Confederated Tribes, Burns, or Fort Bidwell). Many of them were hunter-gatherers and used the land as part of their yearly collecting cycles. Archaeological evidence at Connley Caves, pollen records from several sites in the region, tree ring analyses, and paleontological evidence from Fossil Lake, all help reconstruct past climates and vegetation changes over time in this province (Aikens 1986; Aikens and Jenkins 1994)

According to the 1936 “Forest Type Map of Oregon,” at that time stands of western juniper were on upland areas scattered across the High Desert Province. In 1936, in the area north and northwest of Silver Lake, juniper stands collectively covered an estimated 18,000 acres. From the vicinity of Cougar Mountain, scattered juniper stands existed eastward nearly to Wagontire Mountain; in 1936, they collectively covered an estimated 185,000 acres. Natural stands of western juniper in this province are usually associated with rocky or very stony uplands, lava flows, and ridges where understory vegetation is insufficient to burn during wild fires. Ponderosa pine exists in a few places in this province along the western edge and northwestern part of the province and on BLM land in the northern part of Warner Mountains. These pines are located where 18 inches of rain falls annually. An ecological oddity, the Lost Forest, northeast of Christmas Lake Valley, contains ponderosa pine with some juniper growing on sandy soils. This isolated sand dune area receives only 8.7 inches of rain annually. The isolated stand of pine lies about 25 air miles east of the nearest pine forest, which is in the Mazama Province.

The huge number of closed basins that typify the High Desert Province include perpetually dry lakebeds, lakebeds that are inundated infrequently and for short periods, perpetual lakes that fluctuate in size over time, and wetlands and marshes that are reasonably perpetual. Vegetation on the bottomlands and around these lakes varies according to the frequency, depth, and duration of inundations. This RMP area is almost entirely a natural shrub-grassland steppe on uplands. Sagebrush strongly dominates among a wide variety of shrub species commonly growing in this province. At least 30 shrub species on upland sites and 15 shrub species on bottomland sites have been recorded consistently in this province. The sagebrush species and subspecies are reasonably site-specific and related to soils where they grow (Anderson 1998).

Predominate grass species in the arid shrub-grasslands include bluebunch wheatgrass, Idaho fescue, Thurber’s needlegrass, bottlebrush squirreltail, and Sandberg’s bluegrass. The more arid, sand dune sites may include Indian ricegrass, creeping wildrye, needle-and-thread grass, and thickspike wheatgrass. Some forb species are widespread in this province; however, a few are specifically restricted to local situations and will be discussed under the section on sensitive plant species.

The Klamath Province

The Klamath Province abuts the High Desert in the southwest corner of the subbasin review area; the division from the High Desert Province is based on changes in soils. The Province boundary in the study area begins at the Oregon/California border southwest of Adel and extends north to Honey Creek. It then extends west and northwest to Valley Falls, south of Paisley, across Picture Rock Pass, and west about 5 miles south of Silver Lake into the headwaters of Bridge Creek to the junction of the High Desert, Klamath, and Mazama Provinces. The Klamath Province is characterized by high elevation basaltic mountains, such as Warner Mountains, Dead Indian Mountain, and Winter Rim, although none of these peaks reach timberline. The average annual precipitation for this portion of the Province is 14 inches, 35 percent of which falls between April and July. The exceptions are Winter Rim, which averages 35 inches per year, and Crane Mountain, which averages 65 inches annually (Anderson 1998).

At contact with Europeans, the Klamath Province was inhabited by Modoc, Klamath, and Northern Paiute Tribes, who used the RMP area seasonally for hunting and plant gathering. These Tribal people had little impact on the Province’s natural resources, although they did use fire and other means of landscape manipulation (Aikens 1993).

According to the 1936 “State of Oregon Forest Type Map,” which predates extensive logging activities, about 70 percent of the Lake County part of Klamath Province was covered by trees, primarily ponderosa pine. Only about 1 percent of the Lake County part of the Province was covered in juniper stands. As in the Mazama Province, the Province was not heavily used until after World War II (Stephenson and Boydston 1994). Since then, radical changes in this province include expanded juniper coverage and forest cutting practices.

The Mazama Province

The Mazama Province is characterized by a continuous mantle of aeolian deposits of pumice and other volcanic materials that extend from Brothers in the north to Buck Creek in the south, paralleling Highway 31 and south to the junction of the three provinces. Most of the Mazama Province lies between 4,000 and 5,000 feet and consists of hilly to mountainous topography interspersed with basins. Innumerable large and small buttes, cones, and ridges formed by volcanism dot the landscape. Fields of raw lava and pumice are common. The rainfall in this portion of the province demonstrates the “rain shadow” effect of the Cascades. The Mazama Province averages around 18 inches per year, compared to 145 inches annually in the Three Sisters area to the west (Anderson 1998).

At contact with Europeans, the Mazama Province was occupied by the Klamath, Warm Springs, and Northern Paiute Tribes. These people used the area seasonally as part of their collecting rounds and had few or no permanent living areas other than winter encampments, which were usually held in traditional locations (Aikens 1993). Research indicates that precontact people manipulated the landscape intentionally with fire much more frequently than initially expected (Gruel 1985).

According to the 1936 “State of Oregon Forest Type Map,” which predates extensive logging activity in the area, about 4 percent of the Mazama Province was open and unforested (sagebrush), 10 percent was in stands of western juniper, and 20 percent was in stands of lodgepole pine (some related to fire activity). For most of the entire Province and the area represented in this study, 55 percent was covered by stands of ponderosa pine with some small areas including Douglas-fir and other minor species. In the RMP area, there are thick stands of bitterbrush as an understory and in isolated communities (Anderson 1998).

Logging in that section of the Mazama Province within the RMP area was minimal until after World War II. Because of the lack of roads and transportation for lumber, logging operations were small. One company used a railroad to the Bend area. It was not until the 1980s that logging and replanting of trees began on a large scale in this province (Tonsfeldt 1987, 1988).

Existing General Plant Communities

Introduction: The vegetation in the planning area is discussed at three levels. The top level is the entire subbasin, which includes all three provinces. The mid-

level is the actual plant communities themselves. The site-specific level consists of ecological sites, which describe the potential for plant communities on specific soils.

The uplands of the High Desert Province in Oregon are almost entirely a natural shrub-grassland dominated by different species of sagebrush. Sagebrush species are very site-specific. Basin big sagebrush grows mainly on sites having moderately deep, loamy soils, such as those on droughty bottomlands and fans, while Wyoming big sagebrush is present almost everywhere throughout the uplands of the province. The habitat is similar to basin big sagebrush, but occurs on sandier or more gravelly soils. Mountain big sagebrush is dominant above 5,500 feet on gravelly or stony upland soils. Low sagebrush is strongly dominant on shallow to very shallow stony upland lithic soils, but also grows mixed among other sagebrush species on moderately deep, very gravelly mountain slopes. Silver sagebrush is found on some intermittent lakes and in areas around playas inundated part of the year. Bud sagebrush grows only on the most arid uplands in the province, which are very shallow, very stony soils and are usually alkaline in nature. The distribution of black sagebrush is rare in southeastern Oregon, but it grows in several extensive stands in the Province on the shallowest soiled scablands (Anderson 1998; Kagan and Caicco 1996).

The existing general plant communities and acres of coverage are described in Table 2-1 and in the following section.

Big sagebrush shrubland: Big sagebrush shrubland is the most common vegetative cover type in southeastern Oregon. It appears as a mosaic with shrub-steppe communities over much of the unwooded areas along mountain range foothills and expansive extents in the valley floor. There are several different mixtures of plants within the big sagebrush mosaics. These are big sagebrush (1) with perennial grasslands, (2) with annual grasslands (cheatgrass), (3) within crested wheatgrass seedings, (4) with a variety of shrubs, such as squaw apple or bitterbrush, and (5) in some limited areas on well-drained ash soils and in wetland mosaics. Other plant combinations featuring sagebrush as the dominant plant are big sagebrush (1) with spiny hopsage, (2) with black greasewood, (3) with shadscale, (4) with limited distribution of winterfat, and (5) mixed with low or silver sagebrush.

Native grasses range from rare to abundant, depending on site history and soil/water relations. Native perennial bunchgrasses include bluebunch wheatgrass,

Table 2-1.—General vegetation classes on BLM-administered lands within the planning area

Vegetation type	Acres	Description
Agriculture	14,262	Areas modified for crop growing.
Big sagebrush shrub/grassland	1,709,758	Most common vegetative cover in southeastern Oregon; can occur with various understory plants.
Black sagebrush/grassland	4,235	Has limited distribution in the province; usually grows in very shallow soils.
Low sagebrush shrub/grassland	397,875	Found sporadically throughout eastern Oregon, generally on areas with shallow basalt soils; usually has sparse canopy cover.
Miscellaneous shrub/grassland	70,476	Usually consists of mountain mahogany, bitterbrush, and snowberry communities with a bunchgrass understory; they are often on steep slopes or in association with western juniper.
Mixed conifer forest	1,255	A close-canopied, upper montane or mountain forest type that can be represented by several plant communities containing a number of pine and fir species and a variety of understory shrubs and herbaceous vegetation.
Modified grassland	249,140	Extensive grasslands and shrub grasslands of southeastern Oregon that were formerly composed of native bunchgrasses have been planted with crested wheatgrass, usually after a fire; in some areas, cheatgrass has invaded and become well established.
Mountain big sagebrush/grassland	8,064	Occur at higher elevations on plateaus and rocky flats with minimal soil development.
Ponderosa pine forest	14,076	Widespread forest type in eastern Oregon; usually found in the foothills margin bordering the upland conifer types on the national forests; widely spaced, overstory pines often cover western juniper or other conifers; the shrub and herb layers form a diverse and prominent ground cover component in this forest type.
Quaking aspen	2,063	Widely scattered throughout the coniferous forest and sagebrush grasslands of eastern Oregon; can be found in isolated pockets and may be mixed with western juniper, which is replacing the quaking aspen on many sites.
Riparian and wetlands	40,676	Extremely valuable far beyond their limited distribution; the variety of shrubs, grasses, and forbs present depends on the degree and duration of wetness and shade at each location.
Salt desert shrub/grassland	261,019	Occurs in alkaline playa or dry lake basins of the Great Basin Ecoregion of the resource area; especially prominent around Lake Abert, Summer Lake, Alkali Lake, and Warner Lakes Basin; consists of salt-tolerant shrubs and grasses.
Silver sagebrush shrub/grassland	27,161	Usually found in moist playas or on semi-alkaline flats and valley bottom lands.
Unvegetated	56,686	Seasonally wet or dry playas, bare rock, recent burns, and barren lava flows.
Vegetated lava flow/sand dune	73,371	Large expanses of barren lava fields and aeolian sands with occasional isolated patches of tall and low sagebrush communities occur throughout the area.
Western juniper woodland	215,052	Areas of open-canopy woodland with western juniper as primary tree species; understory vegetation usually dominated by sagebrush species, and western juniper is often an invader into sagebrush grass community as a result of fire suppression.

Sandberg's bluegrass, Idaho fescue, Great Basin wildrye, junegrass, needle-and-thread grass, Thurber's needlegrass, western needlegrass, and, in more disturbed situations, bottlebrush squirreltail. Introduced grasses are primarily annual cheatgrass and perennial crested wheatgrass.

Black sagebrush/grassland: Black sagebrush has a limited distribution in the High Desert Province and is considered a "rare type" there. This plant community often occurs on shallow scabland soils on plateaus and gentle slopes. The sites have extensive areas of exposed rock and often do not have enough vegetation to support wildland fires (see proposed Foley Lake Area of Critical Environmental Concern [ACEC]/Research Natural Area [RNA], Special Management Areas section). Sandberg's bluegrass usually is the dominant grass that makes up most of the vegetation cover; however, other bunchgrasses also occur on these sites. Black sagebrush is the dominant, and often only, shrub present on these sites. In some areas, these black sagebrush stands can be extensive or occur in a mosaic with low or big sagebrush. Occasionally, bitterbrush is found as well. Gray rabbitbrush and Truckee green rabbitbrush also occur on these sites.

Silver sagebrush/grassland: The silver sagebrush/grassland community is usually found in playas, which are moist, semi-alkaline flats or valley bottomlands. Some of the playas are quite extensive. Silver sagebrush occurs in playas because of its tolerance of the alkalinity and standing water. This tall shrub community is moderately- to widely-spaced. It grows in areas that have been deflated (eroded by wind) and subsequently partially filled with sediment. Although rhizomatous species such as creeping wildrye, milkvetch, and cress occasionally occur, the understory can be dominated by widely-spaced bunchgrasses, such as Nevada bluegrass, mat muhly, and alkali grass. Silver sagebrush is the dominant and characteristic shrub of this community; however, green rabbitbrush is a common associate.

Low sagebrush/grassland: Low sagebrush communities are found throughout eastern Oregon, generally on areas with shallow, clayey soils of basalt origin. Low sagebrush is the primary dominant, and often the only shrub in the stand; however, Sandberg's bluegrass is also commonly found. Other associate grasses are bluebunch wheatgrass, Idaho fescue, and bottlebrush squirreltail. Low sagebrush is usually the dominant vegetation in shallow soil and in rocky, claypan conditions that exclude the formation of other sagebrush and shrub types. In many cases, low sagebrush does not form extensive landscape-level covers but is part of the

large big sagebrush and sagebrush mosaic. The sites have extensive areas of exposed rock and often do not have enough vegetation to support wildland fires. Low sagebrush can also occur within a quaking aspen mosaic. In the spring, when the snow melts and soils warm, these areas are rich in colorful diversity from the perennial and annual wildflowers that grow there.

Mountain big sagebrush/grassland: Mountain big sagebrush communities occur on plateaus, mountain toeslopes, and stony flats with minimal soil development at high elevations in the High Desert Province. This medium to medium-tall shrubland varies with widely-spaced to fairly dense shrubs that occur on deep-soiled to stony flats, ridges, and mountain slopes, and usually in cool, moist areas with some snow. In this community, Idaho fescue is the most common and diagnostic grass. Mountain big sagebrush is the dominant and only important shrub, but low sagebrush can occur in some places. Other shrubs that can occur are chokecherry, serviceberry, snowberry, bitterbrush, and buckthorn. Occasionally, mountain big sagebrush grows in snowbank areas or other moist sites within this community. Few trees occur in this community, but quaking aspen and mountain mahogany may be present. This is a forb-rich community where paintbrush, potentilla, geum, lupines, and buckwheat species are abundant.

Miscellaneous shrub/native perennial grassland: Mountain mahogany shrubland is found on the steep, rocky slopes and mountain ridges in southeastern Oregon. It usually appears as a minor component within the old growth western juniper woodland types or transitions in and out of sagebrush steppe. This cover type is commonly encountered but generally exists as units too small to be mapped. This widely-dispersed tall shrub community grows in rock talus, rock outcrops, and in the soil pockets within the rocky slopes along with big sagebrush. It can be the dominant overstory vegetation with occasional western juniper and low sagebrush or bitterbrush, several buckwheats, and some grasses (bluebunch wheatgrass, Sandberg's and Nevada bluegrasses, Idaho fescue, and western and Thurber's needlegrasses).

Bitterbrush communities are found in a medium-tall shrubland steppe with bunchgrass or cheatgrass understory. Bitterbrush can be dominant or codominant with big sagebrush. Idaho fescue is the characteristic native bunchgrass, with bluebunch wheatgrass codominant at lower elevations, while western needlegrass is dominant at higher elevations and where soils are sandier (Anderson 1998). Rabbitbrush species are common associates. Basin big sagebrush and mountain big

sagebrush grow as codominants in some areas. Juniper and ponderosa pine are occasionally found as isolated individuals in this plant community.

Snowberry communities are found on steep slopes between alpine habitats and riparian or sagebrush steppe. They are usually in areas with some soil development, north-facing, very steep slopes, and can be in a mosaic with quaking aspen groves. Thurber's needlegrass, bluebunch wheatgrass, Idaho fescue, and Sandberg's bluegrass are found as understory. Many forbs grow in the area with snowberry, as do mountain mahogany, quaking aspen, and mountain big sagebrush. Juniper can be found with these shrubs at lower elevations.

Brush/clearings: These plant communities are the result of human actions (such as physically removing brush or timber harvest) or the result of fires (wild or prescription).

Salt desert scrub/grassland—alkaline plant communities: This plant community occurs in the alkaline playa lake basins of the northern Great Basin. It is especially prominent around Lake Abert, Summer Lake, Alkali Lake, and the Warner Lakes. These are low to tall shrub communities comprised of dispersed alkali-tolerant vegetation. Salt desert scrub is a “catch-all” term that describes several different environments more common in Nevada. On the most saline, seasonally flooded sites, black greasewood is dominant, and winterfat is usually associated with droughty soils with high carbonate content on alluvial fans and toeslopes. Sites with better drainage support a variety of shrubs and several holphytes (salt tolerant plants), such as shadscale, hopsage, budsage, rabbitbrush, and grasses such as saltgrass, bottlebrush squirreltail, and Great Basin wildrye. Salt desert scrub is surrounded by big sagebrush or sagebrush steppe cover types. The most extensive areas are always associated with the large, ephemeral lakes of the region. However, there are numerous small pockets of this cover type scattered sporadically throughout southeastern Oregon (Anderson 1998; Kagan and Caicco 1996). The proposed ACEC for the Spanish Lake area is to preserve this plant community study.

Lava land/sand dunes (vegetated): There are large expanses of sparsely-vegetated lava fields with occasional isolated patches of tall shrub communities where Wyoming and basin big sagebrush predominate and low shrub communities may also occur. These include barren, recent lava flows with no vegetation, lava flows with big sagebrush inclusions, and flows which have recently been invaded by vegetation. Bluebunch

wheatgrass, Sandberg's bluegrass, needlegrass, Idaho fescue, and junegrass occur in soil pockets in these flows. However, bare lava characterizes large areas of this type. While big sagebrush is the principal dominant plant, low sagebrush is also common at certain sites. The two rabbitbrushes are also associates. Other shrubs found are currants, bitterbrush, and desert-sweet. The vegetated sand dunes have a variety of grasses, especially Indian ricegrass, creeping wildrye, and Great Basin wildrye, while only a few shrubs survive on the dune systems. They are found within the salt desert shrub community list.

Unvegetated ground: These areas can be wetland playas that are seasonally wet and dry, bare rock areas, open water, recent burns, barren lava fields or sand dunes, and areas where no data is available.

Modified grassland—crested wheatgrass and cheatgrass: Extensive grasslands in southeastern Oregon that formerly were composed of native perennial bunchgrasses have today been planted with crested wheatgrass seedings and/or have been invaded by cheatgrass. Both of these species originated in Eurasia but have adapted to this climate and soil.

Cheatgrass was inadvertently introduced in America with cattle and in hay used for ballast in ships; this annual grass can outcompete native grasses by germinating in the fall. Presently, these grasslands are used primarily for spring grazing but provide little forage value. Weedy native and exotic species may also be present or even dominant. These large expanses of cheatgrass can be the result of intense fires, repeated burning of the same area, unsuccessful seedings, historic overgrazing, repeated spring use, abandoned farming, and other disturbances.

In the past, many contiguous acres were planted predominantly with crested wheatgrass after wildland fires. These communities remain a dominant crested wheatgrass community for several years; then, depending on soil type and grazing pressures, native shrubby species such as sagebrush and rabbitbrush begin to invade. Forbs commonly found in this type of community include yarrow, milkvetch, arrowleaf balsamroot, spreading phlox, salsify, and mullein. The ecological integrity of such sites is low, especially over large areas, because there are few mosaics of other plant communities, little diversity of wild animal species that use these communities, and disruption of corridors for animal movement. Cheatgrass and noxious weeds may also become established.

Riparian Vegetation—Lotic Systems

Introduction

Riparian vegetation is dependent on the stream channel type, duration of water availability, soil type and depth, climate, and management history. Sedges, rushes, and in some cases, willow and alder, dominate streams with deeper soils and longer-lasting water. Boulder-dominated streams have pockets of vegetation that may be dominated by grass and shrubs. As water availability decreases, herbaceous vegetation shifts from sedges to grasses. The grasses change from wetland obligates—plants that occur almost always in wetlands under natural conditions, to wetland facultative—plants that usually occur in wetlands but occasionally are found in nonwetlands. Lower elevation sites often have alder and dogwood along with willow as the predominant woody vegetation. Higher sites are dominated by willow. There are several species of willow in the resource area, some more dependent on moisture than others. For example, scouler willow can survive dry, upland sites, while sandbar willow requires wet conditions. The presence of these species can assist in determination of stream-site condition as it relates to site potential. Canyon-confined streams in lower reaches often have ponderosa pine as a dominant structural feature. Juniper has invaded many riparian sites and quaking aspen stands and has replaced more desirable riparian species.

Included in these plant communities are the willow floodplain riparian areas, where tall shrub communities with dense willow cover are occasionally interspersed with wetlands, sedge meadows, or moist, forb-rich grassland. This community occurs in broad valley floors as well as in narrow riparian canyons along rivers and streams. Many rivers usually have some cottonwood, willow, rose, snowberry, red-osier dogwood, and some pine and *Prunus* species. Alder is rare on the BLM portion of the RMP area. At one time, cottonwood was probably more prevalent; at present it does not occur widely in Lake County (Anderson 1998). Stinging nettle is present in most areas.

The role vegetation plays in stream condition (bank stability, sediment capture, flood-flow attenuation, and source of woody debris, etc.) depends on channel type. Channel types E3-6, C3-6 and G3-6 (Rosgen 1996) depend on vegetation to control stream function. The type of vegetation is also critical. Larger sedges have more extensive soil-holding ability than grasses like Kentucky bluegrass. Large woody debris such as tree trunks or boulders may supply the bank-forming structure on streams (other than the vegetation-depen-

dent ones).

Structure and type of vegetation is critical to wildlife and fish habitat, even when it does not control stream morphology, condition, or function. Hardwoods, such as quaking aspen, some taller willows, and cottonwood, supply vertical structure for neotropical birds. As the trees age and decay, cavity nesters make use of them. Vegetation also supplies shade to the stream and helps to cool the water. Leaves from hardwoods supply nutrients to the riparian and aquatic system. In some areas, these leaves can be the driving force as a food source for aquatic macroinvertebrates, which in turn become a food source for fish.

Cottonwood deserves special consideration when managing riparian vegetation. Many cottonwood stands have declined in the area. Remnant stands can be found that have little or no regeneration, while some stands can be identified only by the remaining dead and down trees. Cottonwood trees need flood events so that a silt bed is developed for the seeds to establish. Normal water levels do not present the conditions needed for seedling establishment. After establishment, the seedlings must be protected from grazing for a period of time in order to survive.

Riparian vegetation communities are more diverse than the surrounding upland areas, and thus support a wider variety of wildlife species. This is especially true when considering the amount of habitat edge that exists between the riparian and upland vegetation types.

The habitat islands provided by springs are of special significance, because they often provide the only habitat diversity in uniform desert systems.

Grazing Management in Riparian Vegetation

Livestock use in most perennial riparian areas in the planning area is controlled so that grazing does not negatively affect the establishment or regrowth of vegetation. By allowing early season grazing (winter/spring) and then removing the stock, managers ensure that the vegetation has enough soil moisture to regrow, so that by the end of the growing season, adequate cover is present on the banks to protect them from flooding. If the vegetation is removed too late in the year, subsequent high flow events may erode stream banks. Late season grazing often leads to heavy browsing of willows and other hardwoods, as grazing shifts from the drying herbaceous to the remaining green, woody vegetation. As the herbaceous vegetation cures, protein levels drop and the woody material becomes relatively more nutritious. If late season

grazing is permitted, use levels on woody and herbaceous vegetation must be limited.

Wetlands Vegetation—Lentic Systems

The large number of closed basins that typify the High Desert Province include dry lakebeds, lakebeds that are inundated infrequently and for short periods, perpetual lakes that fluctuate in size over time, and wetlands and marshes that are reasonably perpetual. Vegetation on these bottomlands varies according to the frequency, depth, and duration of inundation. Probably the most significant and valuable wetlands in the High Desert Province, from a total ecosystem viewpoint, are those associated with isolated springs and streams scattered over the arid landscape. The variety of shrubs, grasses, and forbs present depends on the degree and duration of wetness and shade at each location (Williams 1998).

Hardstem bulrush-cattail marshes form open to dense, nearly monotypic (solitary) stands of bulrush where standing water is found throughout much of the growing season. Patches of cattail, burreed, and several species of *Scirpus* are the most important graminoids. *Carex* species occur in and around this habitat type, along with *Eleocharis* and *Juncus* species. In some areas, spike rush forms a monotypic community along wetland channels.

Sedge montane meadows and wetlands are scattered throughout the area with tall sedge meadows and wetlands, with dense, rhizomatous, or tufted sedges dominating the meadows. Usually these areas are low in forb production. Tufted hairgrass is the most common grass, occurring at the drier margins. The forbs often present are *Potentilla*, *Geum*, *Lupinus*, and *Lomatium* species and occasionally blue camas and *Perideridium* species. *Salix* species dominate streams that run through these meadows.

Tufted hairgrass montane meadows and valley prairie occur on a few sites in the planning area. These tall montane meadow grasslands with dense, tufted grasses range from forb-rich to grass-sedge dominated areas. Occasionally, willows, silver sagebrush, and black greasewood can be found. Tufted hairgrass is usually the dominant species. In some areas, Nevada bluegrass or Cusick's bluegrass are entirely dominant. *Carex* and *Juncus* species are codominant in wetter margins.

Proper Functioning Condition

In 1991, in response to growing concern over the integrity of ecological processes in many riparian and wetland areas, the BLM Director approved the "Ripar-

ian-Wetland Initiative for the 1990s" (USDI-BLM 1991d), establishing national goals and objectives for managing riparian/wetland resources on BLM-administered land. The initiative's goals were to restore and maintain existing riparian/wetland areas so that 75 percent or more were in proper functioning condition by 1997 and to provide the widest variety of habitat diversity for wildlife, fish, and watershed protection. Subsequently, the BLM established a definition for proper functioning condition and a methodology for its assessment (USDI-BLM 1993a). The BLM has adopted proper functioning condition assessment as a standard for evaluating riparian areas and will use it to supplement existing stream channel and riparian evaluations and assessments.

The functioning condition of riparian and wetland areas is a result of the interaction of geology, soil, water, and vegetation (USDI-BLM 1993a). Proper functioning condition can be defined separately for lotic and lentic waters, as follows:

Lotic waters: (running water systems, such as rivers, streams, and springs (see USDI-BLM [1993a, 1998i]):

Riparian/wetland areas are functioning properly when adequate vegetation, landform, or large woody debris is present to:

- dissipate stream energy associated with high waterflows, thereby reducing erosion and improving water quality;
- filter sediment, capture bedload, and aid floodplain development;
- improve floodwater retention and groundwater recharge; develop root masses that stabilize streambanks against cutting action;
- develop diverse ponding and channel characteristics to provide the habitat, water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and
- support greater biodiversity.

Lentic waters: (standing water systems, such as lakes, ponds, seeps, bogs, and meadows; see USDI-BLM [1994f, 1999e]):

Lentic riparian/wetland areas are functioning properly when adequate vegetation, landform, or debris is present to:

- dissipate energies associated with wind action, wave action, and overland flow from adjacent sites, thereby reducing erosion and improving water quality;
- filter sediment and aid floodplain development;
- improve flood water retention and groundwater recharge;
- develop root masses that stabilize islands and shoreline features against cutting action;
- restrict water percolation;
- develop diverse ponding characteristics to provide the habitat and water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and,
- support greater biodiversity.

Riparian/wetland areas are classified as functional-at-risk when they are in functional condition but an existing soil, water, or vegetation attribute makes them susceptible to degradation. These areas are further distinguished based on whether or not they demonstrate an upward, static, or downward trend.

Riparian/wetland areas are classified as nonfunctional when they clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows, and thus are not reducing erosion, improving water quality, etc., as listed above. The absence of a particular physical attribute, such as a floodplain, is an indicator of nonfunctional condition. However, some elements may not be needed for a stream to function. For example, a bedrock- or boulder-controlled stream would not need vegetation in order to meet the definition of proper functioning condition. Also, since there is no way to improve floodwater retention in these two types of streams, it would not have to meet the third component—"Improve floodwater retention and groundwater recharge"—in order to be in proper functioning condi-

tion.

Riparian/wetland areas are classified as being in unknown condition when the BLM lacks sufficient information to make a determination.

Because the functioning condition of riparian/wetland areas is a result of interaction of geology, soil, water, and vegetation, the process of assessing whether or not a riparian/wetland area is functioning properly requires an interdisciplinary team, including specialists in vegetation, soils, hydrology, and wildlife biology. Because of the unique attributes of individual riparian areas, site-specific and onsite assessments are necessary.

Riparian/wetland areas will function properly long before they achieve an advanced ecological status. The range between proper functioning condition and an area's biological potential then becomes the "decision space" for social, economic, and other resource considerations. Until proper functioning condition is attained, management priorities and options focus on reaching this threshold. Areas that meet proper functioning condition are managed to ensure a continuation of this condition.

In 1996 and 1997, a team of specialists inventoried 113 miles of stream on the LRA using the "Process for Assessing Proper Functioning Condition" (USDI-BLM 1993a). The members included specialists in the fields of hydrology, fisheries, range, botany, and wildlife. Streams were divided into reaches according to their structural and vegetative characteristics, based on management and channel type. Each reach was rated as proper functioning condition, functional-at-risk, or nonfunctional. The trend of the functional-at-risk category was also rated. Ephemeral (streams that flow only in direct response to precipitation and whose channels are above the water table at all times) reaches of streams were not rated. The percentage of intermittent/ephemeral portions of reaches were rated for the intermittent reaches only. Table 2-3 summarizes the results of this survey, indicating the miles of each rating and that rating's percentage compared to the

Table 2-3.—Summary of stream condition in the planning area

Proper functioning condition (miles/%)	Functional-at-risk			
	Trend			Nonfunctional
	Up	Down	Not apparent	
85.48	13.3	0.5	6.65	7.35
75%	12%	0%	6%	7%

total miles rated. Table 2-4 shows functional condition of streams in the planning area. While conducting the field inspections, the team noted management change options or projects that would benefit the streams. Table 2-5 summarizes existing management, miles, and recommended changes, where made, on the functional-at-risk and nonfunctional rated reaches.

The Fremont National Forest has also used the proper functioning condition methodology on some of their streams. In the Deep Creek Watershed, which drains into the Warner Lakes Subbasin, they rated 23 segments as proper functioning condition and 17 as functional-at-risk with an upward trend. In the Chewaucan Watershed, which drains into Lake Abert, 10 segments were rated as proper functioning condition and 3 were rated as functional-at-risk with an upward trend.

Starting in 2000 and continuing in 2001, a riparian score card was being developed that assesses the current interaction of soils, vegetation, and stream channel. These cards are used to compare current conditions to potential conditions for that site. This information will be used in the future to describe desired range of conditions on each site.

Forest and Woodland

Types, Locations, and Acreage

Map V-1 from the Draft Resource Management Plan (RMP)/Environmental Impact Statement (EIS) shows the current LRA vegetation classes, based mainly on GAP 1 satellite imagery completed by the Oregon Natural Heritage Program (Kagan and Caicco 1996). Table 2-6 is derived from this map and shows acreage by forest vegetation classes.

Commercial forest lands in the LRA total 15,331 acres, and are typically low-elevation ponderosa pine located just below national forest lands. Most are relatively small and remote tracts. The two most extensive commercial stands are the isolated stands at Lost Forest (4,153 acres) and Colvin Timbers (591 acres). Since Lost Forest was designated an RNA in 1973, commercial pine forests in that area are not available for timber harvest or development treatments. The remaining 10,587 acres of commercial forest are widely scattered and have a relatively low stand volume. Management on a sustained-yield basis is not feasible. Instead, these lands have been designated as a protection area in the present plan, which allows management treatments but does not require an allowable sale quantity.

Below the commercial forest lands is the drier desert landscape. Precipitation is not sufficient to support ponderosa pine but is adequate for western juniper in many areas. Periodic natural fires, which previously prevented wide-scale juniper establishment, have been absent for over a century. This has allowed juniper to spread from less fire-prone sites to sagebrush and riparian communities. The majority of today's juniper stands are composed of such "invasive" trees. Juniper has invaded the dry fringes of pine stands, as well as sagebrush and aspen sites where it competes vigorously with other species (Wall et al. 2001; Miller and Rose 1999).

The recent expansion of western juniper in the planning area began in the late 1800s (Young and Evans 1981; Eddleman 1987; Miller and Rose 1995). Relict (old growth) juniper woodlands are primarily confined to rocky surfaces or ridges or pumic sands with sparse vegetation and infrequent fires (West 1984; Miller and Rose 1995; Miller et al. 1999a). The current expansion has occurred on more productive sagebrush sites with deep, well drained soils (Miller and Rose 1999). Juniper expansion in the west has been most frequently attributed to the introduction of livestock, reduced role of fire, and optimal climatic conditions during the late 1800s to early 1900s (Tausch et al. 1981; West 1984; Miller and Wigand 1994). Heavy livestock grazing between 1880 and 1930 removed fine fuels that historically carried fire across the landscape, as well as removed competition from other species (Miller et al. 1999b). There was also a reduction in human set fires in the 19th century (Burkhardt and Tisdale 1976; Miller et al. 1994) and wildfire suppression began between 1910 and 1930 (Agee 1993). During the late 1800s until about 1916, winters in southeastern Oregon were more mild and precipitation was greater than the current long-term average (Antevs 1938; Graumlich 1987). These conditions promoted vigorous juniper growth (Fritts and Xiangdig 1986; Holmes et al. 1986).

Juniper's heavy use of soil moisture allows it to aggressively compete with forage species used by deer, pronghorn, and domestic livestock. Watersheds can be degraded by juniper through ground cover reduction and subsequent surface erosion (Buckhouse and Gaither 1982; Gaither and Buckhouse 1983). Treatments of juniper stands have been made, not to enhance the juniper woodland, but to release or establish native grasses and shrubs and improve forage production. The juniper treatment along Buck Creek in deer winter range is an example.

Western juniper now cover about 215,052 acres, which is nearly 7 percent of the LRA (Map V-3). Large

Table 2-4.—Functional condition of streams in the planning area (miles of streams)

Stream Name	Proper functioning condition	Functional-at-risk			Nonfunctional	Not rated
		Up	Down	Not apparent		
Deep Creek	8.05	0.75			0.35	0.35
Parsnip	2.03	0.65				
Drake	4.35	0.55		0.85		
Drake Tributary	0.75					
Camas	1.25	2.30		0.40		
Twentymile	4.30	0.30		0.20		
Twelvemile	3.70	1.05			3.55	
Fifteenmile	5.45	1.45				
Horse	1.55	2.25				
Horse Tributary	1.00					
Honey	5.40					
Snyder	1.75					
Twelvemile	2.60					
Clover	4.40					
Colvin						4.50
Fish	7.90			1.30		
Chewaucan	4.15					
Mill	1.50			1.00	0.25	
Willow	0.60	1.15			0.90	
Moss	0.70	0.40				
Dicks	0.30					
Pine					0.30	
Loveless						0.25
Silver	1.55					
West Fork Silver	1.55	0.55				
Buck	4.00					
Bridge	1.55	0.30			0.25	
Duncan	2.60					
Bridge Creek Draw		0.25				
Crane	0.25					
Kelly	1.20					
Anna River	0.50					
Warlow	2.25					
Guano	6.10			2.90	2.25	
Sagehen	2.20	1.40				
East/West Gulch			0.50			
Total miles rated/(%)	85.48 (75)	13.35 (12)	0.50 (0)	6.65 (6)	7.85 (7)	5.10

Table 2-5.—Management on streams not at proper functioning condition

Existing/recommended livestock management	Stream rating (miles)			
	Functional-at-risk		Nonfunctional	Total
	Trend up	Trend not apparent		
Presently excluded from grazing	2.50	0.00	4.00	6.50
Presently managed for grazing	7.80	0.85	0.35	9.00
Recommend exclusion from grazing	0.80	0.00	0.70	1.50
Recommend management change	1.40	3.65	2.75	7.80
Monitor	0.80	2.35	0.25	3.40

Table 2-6.—Current forest vegetation classes on BLM-administered lands in the Lakeview Resource Area ¹

Forest vegetation class	Acres
Ponderosa pine ²	14,076
Mixed conifer	1,255
Western juniper	215,052
Quaking aspen ³	2,063
Total	232,446

¹ Source is GAP 1 satellite classification, July 1988, unless otherwise noted.

² Source is Lakeview BLM forest inventory.

³ Since minimum resolution is 30 meters x 30 meters and minimum map unit size is only 320 acres, quaking aspen stands, which are typically smaller than this, are assumed to be underestimated here.

expanses of juniper woodlands are found in northern Lake County from the Fort Rock/Christmas Valley area to Frederick Butte and Wagontire Mountain. Other extensive areas of juniper occur in the hills west of Warner Valley and on Juniper Mountain. Most of this juniper is less than 120 years old and falls in the early to mid-seral stage.

Table 2-7 shows the yearly sales of fuelwood, boughs, and fence posts from 1986 to 1998. In general, fuelwood and bough sales have increased in the last 5 years, but, in relation to the resource, there is an opportunity to greatly increase future demand for commercial harvest on juniper woodlands. There could also be regional demand for the salvage and/or utilization of biomass from stand treatments for the generation of electrical energy.

Conditions and Trends

Forested lands in the LRA have been studied as part of the Interior Columbia Basin Ecosystem Management Project (ICBEMP). This project assessed forest conditions and trends on a region-wide basis, as well as smaller portions of the regional study area. The more localized areas were designated as ecological reporting units. Most of the conditions and trends reported in the

ICBEMP's Northern Great Basin Ecological Reporting Unit also apply to the LRA.

Table 2-8 summarizes current forest and woodland conditions and trends for the entire Upper Columbia River Basin Project Area, for the Northern Great Basin Ecological Reporting Unit, and for the four subbasins that contain the LRA. Appendix Q discusses the health of forests and woodlands in the four subbasins.

Special Status Plant Species

Extinction is a natural process. Today, however, plant species are disappearing world-wide at an accelerated pace. The major cause of this phenomenon is large-scale destruction of native habitats throughout the world. Once lost, a species can never be recovered, and there is no way of knowing how useful it may have been. In 1987, the Oregon Legislature passed an endangered species act which gave the Oregon Department of Agriculture responsibility and jurisdiction over threatened and endangered plants (Oregon Administrative Rules 603-73-005). In an agreement between the BLM and Oregon Natural Heritage Program (ONHP), the Program maintains a comprehensive manual and computerized data base on Oregon's rare and threat-

Table 2-7.—Sales of vegetative products in the Lakeview Resource Area, 1986–1998 ¹

Year	Fuelwood			Boughs			Fence posts		
	Permits	Cords	Value (\$)	Permits	Tons	Value (\$)	Permits	Posts	Value (\$)
1986	3	18	49	3	7.0	980	3	1,200	240
1987	4	33	115	3	2.3	322	1	250	50
1988	6	20	76	3	22.0	1,320	3	350	90
1989	1	3	9						
1990	5	51	363	1	2.0	121	1	70	21
1991	6	24	96	1	14.0	1,350	1	200	60
1992	5	11	44	2	4.0	399	2	150	55
1993	5	46	334	2	3.0	260			
1994	15	59	361	3	28.0	2,799	5	324	140
1995	24	80	317	6	14.0	1,420	3	175	80
1996	9	26	408	1	1.0	100	1	43	24
1997	17	60	265	2	0.5	50	5	277	145
1998	17	57	348	1	1.0	10			

¹ Not shown above are three small sales for corral poles and two timber trespass settlements.

ened and endangered plants, animals, and ecosystems. This book is compiled using the most current information available on the distribution and abundance of plants native to Oregon. Inclusion of any given taxon on these lists is based on specific criteria: the most important factors are the total number of known, extant populations in Oregon and world-wide, and the degree to which they are potentially or actively threatened with destruction. Other criteria include the number of known populations considered to be securely protected, the size of the various populations, and the ability of the taxon to persist at a known site. Lists are amended every other year as inventory and monitoring provide new information (ONHP 1995).

The BLM, using these criteria and based on BLM Manual 6840 (USDI-BLM 1988b), has designated their own lists and guidelines into criteria for classifying plants on BLM lands: Federal threatened or endangered, proposed threatened or endangered, candidate threatened or endangered, State threatened or endangered, Bureau sensitive, and Bureau assessment. There are no officially listed Federal threatened or endangered species in Lake County or the LRA. Table 2-9 lists special status plant species in the LRA, and complete definitions can be found in the Glossary. Eight of the proposed ACEC's contain populations of Bureau sensitive plant species.

A conservation agreement with the U.S. Fish and Wildlife Service (USFWS) is in effect in the LRA for Columbia cress, and the species is monitored to prevent

its extirpation. Conservation agreements are being written with the USFWS for Cusick's buckwheat, snowline cymopterus, Crosby's buckwheat, and grimy ivesia. Monitoring is being done on these and other populations of interest.

Special status plant species receive priority attention for inventories, research, monitoring, and for management decisions regarding land-disturbing activities. Federal regulations, state laws, and BLM policy mandates the following actions:

- Maintain and improve critical or essential habitat to prevent deterioration and provide recovery for federally-listed species).
- Maintain, restore, or enhance the habitat of candidate, state-listed, and other sensitive species to maintain the populations at a level which will avoid endangering the species and the need to list the species by either state or Federal governments (see Table 2-9).
- Ensure that BLM-authorized actions within the LRA do not result in the need to list special status species or jeopardize the continued existence of listed species.
- Increase BLM's knowledge about the status and distribution of special status species.

Special status plant species occur in a variety of plant

Table 2-8.—Summary of forest and woodland conditions and trends

Condition or trend	Interior Columbia River Basin-wide scale	Northern Great Basin Ecological Reporting Unit scale	Planning area scale
Successional trend to multi-layer forests	<p>Historically, late-seral communities experienced periodic fires that maintained open, park-like stands of large shade-intolerant trees with low susceptibility to mortality from stress, fire, insects, or disease. Basin-wide, both timber harvest of larger trees and fire exclusions have converted many of the late-seral communities to mid-seral communities. The late-seral multi-layer forests now occur on dry slopes (PNW-GTR-385, p. 80 & 83, and PNW-GTR-405, p. 487).</p> <p>The communities are denser and have higher mortality, higher fuel loadings, and higher susceptibility to crown fire than historical communities (PNW-GTR-405, p. 477). In addition, on USFS lands, timber harvest patch size has been limited by law. The more scattered location of smaller patches has led to the fragmentation of forest landscapes (PNW-GTR-385, p. 76).</p>	<p>In contrast to basin-wide trends, the late-seral forest communities increased from 5 percent to 7 percent of the area of the Northern Great Basin Ecological Reporting Unit. This net increase was dominated by a significant increase in late-seral multi-layer forest types (PNW-GTR-405, pp. 714-718).</p>	<p>Conditions and trends identified at the basin and ecological reporting unit scale apply. The increase in multi-layer stands is the result of encroachment by western juniper at the edges of ponderosa pine stands and a large increase in pine and white fir understory area and density. Timber harvest has resulted in the removal of nearly all old growth pine from most private and many USFS forest stands.</p> <p>The increased number of understory trees has resulted in overstocking of many forest sites, with attendant insect and disease problems (mountain pine beetle and western pine beetle in ponderosa pine, fir engraver in white fir, and dwarf mistletoe in both), and the increase in ladder fuels. Local forests are now more vulnerable to large-scale, stand-replacing disturbances like epidemic-level insect attack and catastrophic wildland fire.</p>
Increase in severity of successional disturbance regimes	<p>Traditional forestry and exclusion of fire have changed successional disturbance regimes and vegetative composition and structure. The change in disturbance regimes is toward longer intervals between more severe disturbances (PNW-GTR-385, p. 92).</p> <p>In the dry forest vegetation group, lethal (stand-replacing) fires have increased substantially (GTR-PNW-385, p. 87, and GTR-PNW-405, pp. 855-873).</p>	<p>Same as Upper Columbia River Basin-wide scale.</p>	<p>As described above, forests have increased in density, resulting in overstocking on many sites. This has resulted in stressed stands more vulnerable to insect and disease attack, as well as a much higher fire hazard due to increased fuel loads and development of ladder fuels. Resiliency (positive response to disturbance events) of local forests has been reduced.</p>

Condition or trend	Interior Columbia River Basin-wide scale	Northern Great Basin Ecological Reporting Unit scale	Planning area scale
Decrease in vegetative diversity	Fire exclusion, proliferation of exotic plants, and heavy grazing during the growing season have brought about a decrease in vegetative diversity. This has caused a decline in vegetative communities that were historically dominated by ponderosa pine, quaking aspen, and cottonwood (PNW-GTR-385, p. 83).	For the Northern Great Basin Ecological Reporting Unit, the area of the interior ponderosa pine cover type decreased 14.57 percent from its historical area (1850–1900), but this change is within its historical range of variability. The lodgepole pine type decreased 10.84 percent from its historical area, but this is also within its historical range of variability (PNW-GTR-405, p. 687).	Extensive areas of older lodgepole pine stands in the northwest portion of Lake County experienced considerable mortality from mountain pine beetle attacks in the 1970s and 1980s. Many of these stands were salvage-logged, and older lodgepole stands vulnerable to attack were also logged. These logged over stands have normally been replanted to lodgepole pine, so the overall cover type change is minor. However, these stands have shifted in age class from late- to early-seral. Noxious weeds are a growing problem, especially in the dry ponderosa pine types. Quaking aspen and cottonwood in riparian areas have significantly decreased within the last 50 years.
Rapid expansion of the western juniper cover type	The upland woodland type has substantially expanded, due largely to exclusion of fire (PNW-GTR-385, p. 82). Past heavy grazing also reduced fine fuels that previously carried fires under natural conditions.	The juniper/sagebrush cover type has increased nearly four-fold over its historical area. This is an ecologically significant change, which means this type is considerably outside its historic range of variability (PNW-GTR-405, pp. 684-685, 687, and 773-783).	The nearly fourfold increase in western juniper/sagebrush type should also apply directly to the planning area. Ecosite inventory identifies juniper sites (usually the old growth sites on rocky ridges or other fire-protected areas), and “invasive juniper” occurring on naturally “nonjuniper” sites. Ecosite inventory work has been completed for the Prineville and Burns BLM Districts, and will be completed for the LRA in 2001. The combined results of these ecosite inventories will provide current information on the area covered by this growing vegetation cover type.

Source: General Technical Report PNW-GTR-385, Nov. 1996, “Status of the Interior Basin, Summary of Scientific Findings,” and General Technical Report PNW-GTR-405, June 1997, “An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath Great Basins.”

Table 2-9.—Documented Bureau sensitive plant species in the Lakeview Resource Area

Scientific name/BLM categories	Common name	Populations on BLM-administered land	Status ¹
BLM Bureau sensitive ²			
<i>Astragalus tegetarioides</i>	Bastard kentrophyta	2	1 ONHP ³
<i>Chaenactis xantiana</i>	Desert chaenactis	2	1 ONHP
<i>Eriogonum crosbyae</i>	Crosby's buckwheat	3	1 ONHP ³
<i>Eriogonum cusickii</i>	Cusick's buckwheat	2	1 ONHP ³
<i>Eriogonum prociduum</i>	Prostrate buckwheat	4	1 ONHP ³
<i>Galium serpenticum</i> var. <i>warnerens</i>	Warner Mountain bedstraw	1	1 ONHP
<i>Gratiola heterosepala</i>	Boggs Lake hedge-hysop	1	1 ONHP
<i>Ivesia rhypara</i> var. <i>rhypara</i>	Grimy ivesia	1	1 ONHP
<i>Ivesia rhypara</i> var. <i>shellyi</i>	Shelly's ivesia	2	1 ONHP
<i>Mimulus evanescens</i>	Disappearing monkeyflower	1	1 ONHP
<i>Pleuropogon oregonus</i>	Oregon semaphore grass	1 ⁴	1 ONHP
<i>Rorippa columbiae</i>	Columbia cress	1 (1) ⁴	1 ONHP
BLM Bureau assessment ²			
<i>Agastache cusickii</i>	Cusick's giant-hyssop	1	2 ONHP
<i>Cymopterus nivalis</i>	Snowline cymopterus	6	2 ONHP ³
<i>Hymenoxys cooperi</i> var. <i>canescens</i>	Copper's goldflower	1	2 ONHP
<i>Mimulus latidens</i>	Broad-toothed monkeyflower	1	2 ONHP
<i>Mimulus tricolor</i>	Three color monkeyflower	1	2 ONHP
<i>Plagiobothrys salsus</i>	Desert allocarya	(2) ⁴	2 ONHP
<i>Sesuvium verrucosum</i>	Verrucose sea-purslane	1	2 ONHP
<i>Symphoricarpos longiflorus</i>	Long-flowered snowberry	5	2 ONHP
BLM Bureau tracking ²			
<i>Allium campanulatum</i>	Sierra onion	4	4 ONHP
<i>Allium bisceptrum</i>	Patis onion	1	4 ONHP
<i>Allium lemmonii</i>	Lemmon's onion	3	4 ONHP ³
<i>Astragalus tetrapterus</i>	Four-winged milkvetch	2	4 ONHP ³
<i>Caulanthus crassicaulis</i>	Thickstemmed wild cabbage	2	4 ONHP
<i>Downingia laeta</i>	Great Basin downingia	4	4 ONHP
<i>Heliotropium curassavicum</i>	Salt heliotrope	3 (1) ⁴	4 ONHP
<i>Melica stricta</i>	Nodding melic grass	2	4 ONHP
<i>Pedicularis centranthera</i>	Dwarf lousewort	4	4 ONHP ³

¹ Status indicates placement on Oregon Natural Heritage Program lists (1998): List 1—threatened with extinction or presumed to be extinct; List 2—threatened with extirpation or presumed to be extirpated from Oregon; List 3—may be threatened or endangered in Oregon or throughout range, but more information is needed to determine status; List 4—not currently threatened or endangered but of conservation concern.

² None of the species shown in this table are listed as threatened or endangered by the USFWS or the State of Oregon. Among these classifications, species classified as BLM sensitive and lists, State endangered are considered most at risk. By contrast, those identified as BLM tracking species are the subject of less intense concern (see the Glossary for definitions or classifications of Bureau sensitive, Bureau assessment, and Bureau tracking).

³ Ash or public physical habitat.

⁴ Found only on private land at this date or/and extirpated from Federal; and plants to be part of RMP planning.

associations and on a variety of physical habitats, many of which have distinctive soil types. Often several special status species occur together. In conservation agreements, these areas are treated as a “plant community.” Vander Schaff (*personal communication*) suggested that the various volcanic ash substrates found in southeastern Oregon have promoted a high degree of plant endemism (a large number of plant species that are found only in certain sites or areas). Numerous species and subspecies have arisen that can occupy these harsh ash sites.

Noxious Weeds and Competing Undesirable Vegetation

Introduction

In Oregon, as well as in other western states, noxious weeds are so thoroughly established and are spreading so rapidly that they have been declared a menace to public welfare (Oregon Revised Statutes 570.505). Noxious weed invasion contributes to the loss of rangeland productivity, increased soil erosion, reduced species and structural diversity, loss of wildlife habitat, and in some instances, is hazardous to human health and welfare, as emphasized in the “Federal Noxious Weed Act” (Public Law 93-629). Some weed species pose a significant threat to multiple use public land management.

Noxious weeds cannot be adequately controlled unless Federal, state, county, and private interests work together. The “Carlson-Foley Act” (Public Law 90-583), as well as state and county laws, make the Federal government responsible for control of weeds on Federal land and provide direction for their control. The LRA operates under the weed protocols set forth in the following documents: “Vegetation Treatment on BLM Lands in Thirteen Western States Final Environmental Impact Statement and Record of Decision” (USDI-BLM 1991b), “Supplement to the Northwest Area Noxious Weed Control Program Final Environmental Impact Statement and Record of Decision” (USDI-BLM 1987a), and the “Integrated Noxious Weed Control Program Environmental Assessment” (EA No. OR-013-93-03) (USDI-BLM 1994d).

However, the “Western Oregon Program Management of Competing Vegetation EIS” was appealed in 1984, which resulted in a court-ordered injunction that prohibited the use of herbicides on all BLM-administered lands in Oregon. The U.S. District Court modified the injunction in 1987 to allow BLM to use four

herbicides to control noxious weeds only (see Appendix G). Since 1987, new herbicides have been developed that are more effective against certain families of weeds, and selective for the target weed species. BLM’s inability to utilize these herbicides under the injunction severely limits our treatment efforts where herbicides are the most effective option. As a result, the weed infestations in these areas are rapidly expanding.

The Oregon Department of Agriculture has developed a classification system to provide guidelines for implementing and prioritizing noxious weed control programs, to assist in the distribution of limited funds, and to serve as a model for other weed classification systems (ODA 2002). This system defines three classes of noxious weed species: (1) weeds that pose a known economic threat and occur in infestations small enough to make eradication or containment possible; (2) weeds that pose an economic threat and whose regional abundance limits control techniques primarily to biological methods; and (3) weeds for which the Oregon Department of Agriculture will implement a statewide management plan.

Noxious weeds and undesirable plants are present throughout the planning area (Table 2-10). The weed control program is dynamic as a result of the influx of new weed introduction and the ongoing implementation of varied control methods. Grazing and fire management, as well as chemical, mechanical, and biological control methods are used as part of an integrated weed management program. These methods are subject to site-specific determination of appropriate techniques. The BLM monitors, on an annual basis, the changes in distribution and new introductions of noxious weeds.

Warner Basin Weed Management Area

The Warner Watershed is a 500,000-acre basin ringed by forest, rim rock, and rangeland. The bottom of the basin contains private hay meadows and the BLM-administered Warner Wetland ACEC. Included in the Warner Basin Weed Management Area are lands within the jurisdictions of the U.S. Forest Service (USFS), BLM, USFWS, Oregon Division of State Lands, and numerous private organizations and individuals. Land ownership in the watershed is approximately one-third private, one-third BLM, and one-third other public agencies.

In 1998, the Warner Basin Working Group, comprised of representatives from public and private lands, was formed to develop a management plan for the water-

Table 2-10.—Noxious weeds present in the planning area

Common name	Scientific name
Bull thistle	<i>Cirsium vulgare</i>
Canada thistle	<i>Cirsium arvense</i>
Dalmation toadflax	<i>Linaria dalmatica</i>
Diffuse knapweed	<i>Centaurea diffusa</i>
Dyers woad	<i>Isatis tinctoria</i>
Field bindweed	<i>Convolvulus arvensis</i>
Halogeton	<i>Halogeton glomeratus</i>
Hoary cress	<i>Cardaria</i> spp.
Mediterranean sage	<i>Salvia aethiopsis</i>
Medusahead rye	<i>Taeniatherum caput-medusae</i>
Musk thistle	<i>Carduus nutans</i>
Perennial pepperweed	<i>Lepidium latifolium</i>
Poison hemlock	<i>Conium maculatum</i>
Russian knapweed	<i>Acroptilon repens</i>
Scotch thistle	<i>Onopordum acanthium</i>
Spiny cocklebur	<i>Xanthium spinosa</i>
Spotted knapweed	<i>Centaurea maculosa</i>
St. Johnswort	<i>Hypericum perforatum</i>
Yellow starthistle	<i>Centaurea solstitialis</i>
Yellow toadflax	<i>Linaria vulgaris</i>

shed that would employ integrated weed management techniques. The working group developed the following three goals:

- 1) Coordinate management and inventory of weeds on all land ownerships within the 500,000-acre Warner Basin Watershed.
- 2) Protect all land resources from the threat of noxious weed invasion in the Warner Watershed.
- 3) Educate resource users and the general public about noxious weed identification, ways that weeds spread, and the means to control those weeds.

The Warner Basin Working Group categorized target weed species into three groups (Table 2-11):

- 1) High priority species, upon which control efforts will continue or be initiated;
- 2) New invaders, which will move to the top of the priority list for eradication if discovered in the Warner Basin; and
- 3) Other species of concern, which are relatively

widespread but are not perceived to be as threatening to the resource values of the Warner Basin as plants in the first two groups.

Soils and Microbiotic Crusts

Introduction

Soils in southcentral Oregon are semiarid, young, and poorly-developed. Chemical and biological soil development processes, such as rock weathering, decomposition of plant materials, accumulation of organic matter, and nutrient cycling, proceed slowly in this environment. Soil recovery processes are also slow; therefore, disruption of soil can lead to long-term changes in ecology and productivity. In many areas, natural or geologic erosion rates are too fast to develop distinct, deep soil horizons. The soils in the LRA are complex and diverse.

Complete soil data are available from the soil surveys for southern Lake and Harney Counties. Incomplete data are available for portions of northern Lake County. This information, on file at the LRA office, contains soil series descriptions, mapping unit descriptions,

Table 2-11.—Warner Basin Working Group weed species categories

Common name	Scientific name
High priority species	
Hoary cress	<i>Cardaria</i> spp.
Perennial pepperweed	<i>Lepidium latifolium</i>
Russian knapweed	<i>Acrotilon repens</i>
New invaders	
Dyers woad	<i>Isatis tinctoria</i>
Leafy spurge	<i>Euphorbia esula</i>
Medusahead rye	<i>Taeniatherum caput-medusae</i>
Purple loosestrife	<i>Lythrum salicaria</i>
Tamarisk	<i>Tamarix</i> spp.
Yellow starthistle	<i>Centaurea solstitialis</i>
Other species of concern	
Bull thistle	<i>Cirsium vulgare</i>
Canada thistle	<i>Cirsium arvense</i>
Common cocklebur ¹	<i>Xanthium strumarium</i>
Halogeton	<i>Halogeton glomeratus</i>
Mediterranean sage	<i>Salvia aethiopis</i>
Poison hemlock	<i>Conium maculatum</i>
Scotch thistle	<i>Onopordum acanthium</i>
Spiny cocklebur	<i>Xanthium spinosa</i>
Spotted knapweed	<i>Centaurea biebersteinni</i>
Western waterhemlock ¹	<i>Circuta douglasii</i>

¹ Denotes plants that are native and not noxious—these plants are listed by the working group as species of concern because they are poisonous to livestock.

interpretations, and detailed soils maps. Major prime farmland soil mapping units of the southern planning area are discussed in Appendix C1.

Soils in the northern Lake County portion of the resource area are currently being mapped by the BLM/Natural Resource Conservation Service ecological site inventory crew out of Burns, Oregon. The inventory procedure is described in Appendix C2 of the Draft RMP/EIS.

Soil Erosion

In the semiarid areas of the planning area, bare soil between plants is 10 to 20 percent of the total ground cover of a native plant community; therefore, the soil erodes naturally. In addition to this background erosion rate, management actions affect the rate at which soil erodes. Any activities that remove vegeta-

tive cover increase the erosion rate. Some soils (for example, shallow soils over bedrock) are particularly vulnerable to soil erosion. If the surface layers of these soils are washed or blown away, the productivity potential is lost for a geologic time span.

Soil Management and Productivity

Current management practices, such as proper stocking rates for livestock, grazing rotation, periodic rest from grazing, improved road design, selective logging, rehabilitation of surface disturbances, restricting vehicles to existing roads and trails, rehabilitating mined areas, and control of concentrated recreational activities, have reduced erosion effects and improved soil conditions.

Management practices may affect soils' ability to maintain productivity by influencing disturbances such

as displacement, compaction, erosion, and alteration of organic matter and soil organism levels. When soil degradation occurs in semiarid, high desert regions, natural processes are slow to return site productivity. Prevention of soil degradation is more cost- and time-effective than remediation or waiting for natural processes.

Soil productivity varies widely due to characteristics such as soil depth, nutrient status, available water-holding capacity, and site characteristics, including elevation, aspect, and slope gradient. The most productive soils for forage or wood fiber production are found in valley bottoms, toeslopes, benches, and broad ridgetops. Demands for maintaining a productive ecosystem create a need for maintaining long-term soil productivity. Current soil productivity reflects site-specific natural conditions and past management practices.

Historically, erosion occurred on upland soils and in drainage channels as a result of uncontrolled land use, prolonged drought, and catastrophic storms. Many drainages were deeply incised by gully erosion more than 30 years ago. Some geologic erosion and localized erosion caused by concentrated uses still occurs.

Soil bulk density (mass per unit volume), porosity (hydraulic conductivity), organic matter content, moisture content, nutrient content, and soil temperature are affected to various degrees by surface management actions. In turn, these factors affect soil-water interactions, productivity, nutrient cycling, water holding capacity, and soil erosion rates.

Soil compaction may result from concentrated activities such as equipment operation, livestock grazing, and pedestrian traffic. Compaction can reduce water infiltration rates, resulting in less available moisture for plants and increased surface runoff and root restrictions. These factors may contribute to reduced site productivity, increased soil erosion rates, and water quality degradation.

Microbiotic Crusts

Microbiotic crusts consist of lichens, mosses, green algae, fungi, cyanobacteria, and bacteria growing in a thin layer on or just below the soil surface. Found in spaces between larger plants, these crusts play a role in controlling soil erosion, filtering water, retaining soil moisture, and improving soil fertility by fixing atmospheric nitrogen and contributing soil organic matter. In some instances, the crusts appear to improve plant seedling establishment. Microbiotic crusts are ex-

tremely sensitive to air pollution and have been used as a parameter to measure the effects of air pollution in protected areas, such as wilderness areas and national parks.

Based on research throughout the entire West, parameters for the ecology and management of biological soil crusts have been developed by the Department of Interior (Belnap 2001). Factors found involving presence, density, cover, and species diversity of crusts were:

- Elevation: relative cover increases with elevation and effective precipitation until vascular plant cover precludes their growth (Snake River Plain lower elevation than LRA).
- Soils and topography: chemistry of soils, amount and type of rocks, slope, aspect (Northern Oregon and Southcentral Washington loess).
- Disturbance: relative to intensity, type, and time of year.
- Timing of precipitation (Southwest U.S./Eastern Great Basin have summer monsoons and winter rains; Western Great Basin has winter/spring rains only).
- Vascular plant community: vertical and horizontal structure.
- Ecological gradients: some crusts are indicators, others are not.
- Microhabitats: moss can form bedding areas for lichens.

These lists demonstrate the variability of biological crusts and are indicators that need to be studied in the LRA. It also is evident that research done in one area, such as the Eastern Great Basin, may not be applicable to the Western Great Basin. However, for the entire area, the majority of microbiotic crust growth is during wet, cool periods, which would be in early spring in the LRA. Generally speaking, total crust cover is inversely related to vascular plant cover, as there is a positive relationship of crust cover to available soil surfaces. Plant communities demonstrating high diversity of microbiotic crusts are: Wyoming sagebrush, basin sagebrush, mountain big sagebrush (variable), low sagebrush, black sagebrush, and salt desert shrub in southeastern Oregon.

In the “National Range and Pasture Handbook,” the Natural Resource Conservation Service identified microbiotic crusts as 1 of 17 rangeland health ecological attributes to be used as an indicator of rangeland health. Crusts are considered important to soil and site stability, watershed and hydrologic cycles, and soil and plant community integrity. Site assessments of biotic crusts involve a determination of the amount and distribution that would be expected for a healthy site. Reference sites that are used as benchmarks of late-seral vascular plant communities will be useful for determining expected biotic crust characteristics. However, this research and the work of others suggest that biotic crusts respond to their environment in a manner distinct from that of vascular plants; crust cover and composition are more sensitive to soil chemistry and disturbance, as well as atmospheric inputs of moisture and nutrients. Further research will be needed to accurately determine “expected values” for biotic crust abundance and composition at various sites.

The Northwestern Great Basin has had very little microbiotic crust monitoring or research, other than at Ponzetti’s (2000) two paired sites and unpublished research at Oregon State University Northern Great Basin Experiment Station in Harney County (Svejcar, T., *personal communication*). Crusts have been collected, and some identified and curated for the BLM herbarium. The most important work is the collecting of data by the ecological site inventory crew. In the North Lake County Ecological Site Inventory soil/plant community survey, the teams have scored the range form for classes and percent of cover for lichen, mosses, and algae. Research is being encouraged for microbiotic crusts in all of this section of the Northern Great Basin to determine if principles established elsewhere in the West are applicable here. When this new information becomes available, it should be possible to establish microbiotic crust guidelines for future management decisions.

Ponzetti’s research used paired plots to study biotic soil crust cover and composition, one plot livestock-grazed and one plot excluded from livestock. Parameters measured were cover of microbiotic crusts and vascular plants, soil surface pH, electrical conductivity, and calcareous index value, precipitation, elevation aspect, and temperature. In conclusion, Ponzetti found that the total crust cover to be highest on sites with lower pH, electrical conductivity, and calcareous index value. Livestock exclusion was not an important gradient in the ordination of these data, because it was overshadowed by strong soil chemistry and climate gradients. However, overall community composition of soil crust

species was different between grazed and long-ungrazed sites. Grazed transects had lower cover of biotic crusts, nitrogen-fixing lichens, crust-dominated soil surface roughness, and species richness. Also, more bare ground existed in grazed transects, and total bunchgrass was higher within exclosures. Ponzetti concluded that livestock-related reductions in cover and richness of biotic soil crusts were apparent while significant impacts to vascular plants were not obvious, that microbiotic soil crusts were sensitive indicators of disturbance, and that there are strong compositional differences in shrub steppe crust communities of Oregon, which are correlated with regional soil and climate gradients.

Water Resources/Watershed Health

Introduction

Hydrologic regions, subregions, basins, and subbasins are delineated based on protocol defined by the USGS. This system delineates a hierarchy of geographical regions and their subparts, such as subregion, basin, subbasin, watershed, and subwatershed. Each hydrologic unit is referred to as a field and given a two-digit numeric identifier. The code, called a hydrologic unit code, is a unique numeric identifier. Table 2-12 shows an example of this hierarchical breakdown.

The LRA is comprised primarily of four subbasins (or fourth field hydrologic units): Summer Lake, Lake Abert, Warner Lakes, and Guano (see Map R-4 of the Draft RMP/EIS and Table 2-13). These subbasins are part of the larger Oregon Closed Basins Subregion and the Pacific Northwest Region. The topographies of these large areas direct surface and some shallow subsurface water to streams, lakes, reservoirs, or playas. These are internally drained subbasins and do not have an outflow like traditional watersheds.

There are two main types of watersheds in the LRA. One is the traditional watershed, which has considerable slope and a network of stream channels that start as ephemeral in the headwaters and gradually are fed more water down slope, transitioning to intermittent, and finally perennial. These watersheds have streams which can support a variety of aquatic species. The other type is the closed basin. These are desert areas where the precipitation infiltrates locally and mainly supports the vegetation on site. Some water does move over land and subsurface to large playas or wetlands on valley bottoms. Of the little precipitation received,

Table 2-12.—Hierarchy of hydrologic units, Lower Crooked Creek (171200060901)

Hierarchy term	Hydrologic unit code	Numeric identifier	Name	Size (acres)
Region	First Field	17	Pacific Northwest	165,757,150
Subregion	Second Field	12	Oregon Closed Basins	11,072,000
Riverbasin	Third Field	00	The subregion and river basin are the same, as indicated by the 00.	11,072,000
Subbasin	Fourth Field	06	Lake Abert	652,800
Watershed	Fifth Field	03	Crooked Creek	56,750
Subwatershed	Sixth Field	01	Lower Crooked Creek	26,500

Table 2-13.—Lakeview Resource Area subbasins and watersheds

Subbasin	Hydrologic unit code	Total acres	Number of 5 th field watersheds
Summer Lake	17120005	2,624,000	20
Lake Abert	17120006	652,800	6
Warner Lakes	17120007	1,216,000	8
Guano	17120008	1,900,000	11

more is used on site then is delivered downslope.

Subbasins

The Summer Lake Subbasin is more than 2.5 million acres in size. It is bounded by forested mountains on the western edge and desert hills to the north, east, and south. There are 20 fifth-field watersheds in the subbasin. Major waterbodies include Summer Lake, Silver Lake, Thompson Reservoir, Ana Reservoir, Duncan Reservoir, ZX Reservoir, and Detention Reservoir. Alkali Lake and North Alkali Lake are low-lying areas seasonally inundated with water. Paulina Marsh is a large wetland that drains into Silver Lake. The lakes in the area are large and shallow, so the shorelines change dramatically with seasonal filling and drying cycles.

The Lake Abert Subbasin is about 650,000 acres in size. It is bounded by Abert Rim to the east, forested mountains to the west and south, and desert hills to the north. The major waterbody is Lake Abert, a large, shallow, saline lake. There are six fifth-field watersheds in the subbasin. The Chewaucan River is the largest stream flowing into the lake and has upper and lower marshes associated with it. The Lake Abert Subbasin contains internally drained basins and many seasonally flowing streams.

The Warner Lakes Subbasin is more than one million acres in size. It is bounded by Hart Mountain to the east, Abert Rim and Warner Mountains to the west, desert hills to the north, and forested mountains to the

south. There are eight fifth-field watersheds in the subbasin. It has many lakes, which form an interconnected chain parallel to the Hart Mountain uplifted fault block. These are Crump, Hart, Anderson, Swamp, Flagstaff, Upper Campbell, Campbell, Turpin, Stone Corral, and Bluejoint Lakes. These lakes are associated with extensive wetlands. The major perennial streams flow from the Warner Mountains.

Guano Subbasin is almost 2 million acres in size. It is bounded by Hart Mountain on the west and desert hills on the north, east, and south. There are 11 fifth-field watersheds in the subbasin. It has many seasonal lakes and wetlands. The subbasin has perennial, intermittent, and ephemeral streams, but is dominated by streams which flow only seasonally. Guano Creek is a main intermittent stream which drains from Hart Mountain.

Hydrologic Integrity

The ICBEMP scientific assessment (USDA-FS and USDI-BLM 1996a) determined hydrologic integrity for the subbasins in the Columbia Basin: "A hydrologic system that exhibits high integrity is a network of streams, along with their groundwater ecosystems, within the broader landscape where the upland, floodplain, and riparian areas have resilient vegetation, where capture, storage, and release of water limits the effects of sedimentation and erosion, and where infiltration, percolation, and nutrient cycling provide for diverse and productive aquatic and terrestrial environments . . . hydrologic integrity was estimated based on disturbance sensitivity and recovery potential

of watersheds, plus the amount and type of past disturbance. Watersheds with high impact (disturbance) and low recovery potential have higher probabilities of containing altered hydrologic functions than other areas, and are consequently classified as low integrity. Conversely, areas with low relative effect from mining, dams, roads, cropland conversion, and grazing, and which also have high recovery potentials, are considered to have the highest probable hydrologic integrity.”

The Summer Lake and Abert Lake Subbasins were rated as having high forest hydrologic integrity. The Warner Lakes and Guano Subbasins were rated as having high range hydrologic integrity (USDI-BLM 1996h). Appendix A2 summarizes the ICBEMP scientific assessment applicable to the planning area.

Streams

The streams in the RMP area originate in the higher elevation hills and mountains, mostly in the adjacent Fremont National Forest (see Table 2-14 for stream characteristics by subbasin). They then flow to the lower elevation valleys, lakes, wetlands, and playas. Most surface runoff is from snowmelt or rainfall at the higher elevations, producing peak discharges in the spring. Year-to-year variability in precipitation influences streamflow both in quantity and duration. Water

scarcity has led to increased water storage, water diversions, and groundwater withdrawal associated with irrigation. These projects have significantly altered natural flow regimes, which has changed habitat conditions, channel stability, and timing of sediment and organic material transport. Throughout the planning area, streamflows have been altered by management activities, such as water impoundments, water withdrawal, road construction, and grazing.

The Summer Lake Subbasin includes Ana River and the small streams which flow off Winter Rim into Summer Lake. The Ana River is a spring-fed system which is captured in a reservoir and then flows to Summer Lake. Buck, Bridge, and Silver Creeks are the main streams which flow into the Paulina Marsh and then into Silver Lake. There are many intermittent streams and ephemeral drainages where the water infiltrates into the soil or evaporates. The intermittent streams have surface flows for some of the year or flows which move underground for a portion of the stream. They are in contact with the water table and either receive water from the groundwater system to surface flow or lose surface water to the groundwater. Ephemeral drainages are channels in which surface water flows immediately after snowmelt or rainfall and are always above the water table.

Table 2-14.—Stream flow statistics in the subbasin review area

Subbasin/ (hydrologic unit code)	Creek name	Period of record	Station number/(location)	Drainage area (square miles)	Average annual flow (cfs)	Peak flow (cfs)	Base flow (cfs)
Summer Lake (17120005)	Buck Creek ¹	1989– 1991	10391050 (NE¼SW¼ Section 18, T.28S., R.14E.)	300	11.9	85	1.5
Lake Abert (17120006)	Chewuacan River ²	1925– 1982	10384000 (SW¼NW¼ Section 26, T.33S., R.18E.)	275	146	6,490	9.4
Warner Lakes (17120007)	Twentymile Creek ²	1911– 1982	10366000 (SW¼NW¼ Section 25, T.40S., R.23E.)	194	52	3,670	0 ³
Warner Lakes (17120007)	Deep Creek ²	1923– 1982	10371500 (SW¼NW¼ Section 15, T.39S., R.23E.)	249	134	9,420	1.7
Warner Lakes (17120007)	Honey Creek ²	1950– 1982	10378500 (SW¼SW¼ Section 20, T.36S., R.24E.)	170	34	11,000	0 ³

¹ Information from “Compilation of Surface Water Records for Oregon, Sliver Lake, Warner Lake, and Goose Lake Basins, 1979–1991,” Oregon Water Resources Department.

² Information from “Statistical Summaries of Streamflow Data in Oregon ” Volume 1, Eastern Oregon. USGS Open Field Report 84-454, 1984.

³ No flow at times.

In the Lake Abert Subbasin, the Chewaucan River is the main stream system. It has many headwater tributaries in the forested mountains. It flows through the Chewaucan Marsh in the valley bottom and supplies most of the water to Lake Abert. There are many intermittent and ephemeral drainages, which dry up seasonally.

The major streams in the Warner Lakes Subbasin flow from the Warner Mountains. These include Twelvemile, Twentymile, Deep, and Honey Creeks. Most of the surface water would flow into the Warner Lakes and wetlands but is diverted for irrigation. There are many intermittent and ephemeral drainages, which dry up seasonally.

In the Guano Subbasin, Guano Creek is the major stream. It is intermittent, as are most of the other streams. There are many ephemeral streams, which have surface water in the channel only after snowmelt or rainfall. There are perennial springs which flow for a short length before moving underground.

Surface Water Quality

In the State of Oregon, the Environmental Protection Agency (EPA) has delegated authority to implement the “Federal Water Pollution Control Act” of 1972 and amendments (“Clean Water Act” [CWA] of 1977) to the Oregon Department of Environmental Quality (ODEQ). Federal land management agencies are designated by the State to assist in CWA implementation on public lands. As a designated management agency, the BLM must: (1) implement and enforce natural resource management programs for the protection of water quality on Federal lands under its jurisdiction; (2) protect and maintain water quality where it meets or exceeds applicable state and Tribal water standards; (3) monitor activities to assure that they meet standards and report the results to the State of Oregon; and (4) meet periodically to recertify water quality best management practices (BMP’s). BMP’s are methods, measures, or practices to prevent or reduce water pollution, including but not limited to structural and nonstructural controls, operations, and maintenance procedures. BMP’s are applied as needed to projects (Appendix D).

Water quality, as defined by the CWA, includes all the physical, biological, and chemical characteristics which affect existing and designated beneficial uses. The State of Oregon is required to identify which beneficial uses a waterbody currently supports or could support in the future. The primary beneficial uses of surface water are domestic water supply, salmonid and resident

fish habitat, irrigation, livestock watering, wildlife and hunting, fishing, water contact recreation, and aesthetic quality. Most streams on the LRA support State-designated beneficial uses. Elevated summer temperatures are the primary water quality problem identified by the State for some streams on the LRA. While some streams have been monitored and violate the State standard for the resident fish and aquatic life water temperature numeric criteria, it is unknown if the natural temperature potential would meet the criteria. ODEQ is currently reviewing water quality standards (including temperature) for coldwater fisheries habitat in eastern Oregon. Revised standards could be available within the next 5 years.

Causes of stream degradation are removal of riparian vegetation and destabilization of streambanks. The land use most commonly associated with these problems in the planning area is grazing. Other land uses associated with degraded streams include roads, trails, water withdrawal, reservoir storage and release, altered physical characteristics of the stream, and wetlands alteration.

The State of Oregon has established beneficial uses for the surface and groundwater within the planning area and water quality standards which protect these uses. These uses are shown in Tables 2-15 and 2-16.

The current water quality standards can be found at the ODEQ web site (URL: www.deq.state.or.us). They are Oregon Administrative Rules, Department of Environmental Quality, Water Pollution, Division 41, “State-wide Water Quality Management Plan.” The water quality standards are in QAR’s 340-041-0001 to 0975 and specifically 340-041-0922—Beneficial Water Uses to be Protected in Goose and Summer Lake Basins, 340-041-0925—Water Quality Standards not to be Exceeded in Goose and Summer Lake Basins, 340-041-0882—Beneficial Water Uses to be Protected in Malheur Lake Basin, and 340-041-0885—Water Quality Standards not to be Exceeded in Malheur Lake Basin.

Water Quality Impaired Stream Reaches

The State of Oregon is required by section 303(d) of the CWA to identify waters which are water quality impaired. This list is updated biannually and the State is required to develop a total maximum daily load allocation for each pollutant of concern. Table 2-17 lists the stream reaches in the planning area that have been identified by the ODEQ as being water quality limited. Summer Lake, Lake Abert, and Guano Subbasins are scheduled for total maximum daily load

Table 2-15.—Beneficial uses for Summer Lake, Lake Abert, and Warner Subbasins

Beneficial Use	Freshwater lakes and reservoirs	Highly alkaline and saline lakes	Freshwater streams
Public domestic water supply	◆		◆
Private domestic water supply	◆		◆
Industrial water supply	◆	◆	◆
Irrigation	◆		◆
Livestock watering	◆		◆
Salmonid fish rearing (trout)	◆		◆
Salmonid fish spawning (trout)	◆		◆
Resident fish and aquatic life	◆	◆	◆
Wildlife and hunting	◆	◆	◆
Fishing	◆	◆	◆
Boating	◆	◆	◆
Water contact recreation	◆	◆	◆
Aesthetic quality	◆	◆	◆

Table 2-16.—Beneficial uses for Guano Subbasin

Beneficial use	Natural lakes	All rivers and tributaries
Public domestic water supply		◆
Private domestic water supply		◆
Industrial water supply		◆
Irrigation	◆	◆
Livestock watering	◆	◆
Salmonid fish rearing (trout)		◆
Salmonid fish spawning (trout)		◆
Resident fish and aquatic life	◆	◆
Wildlife and hunting	◆	◆
Fishing	◆	◆
Boating	◆	◆
Water contact recreation	◆	◆
Aesthetic quality	◆	◆

development by the year 2007. The Warner Lakes Subbasin is scheduled for total maximum daily load development by 2003.

USFS and BLM (1999) "Protocol for Addressing Clean Water Act Section 303(d) Listed Waters" was issued to provide the agencies with a consistent approach to addressing water quality limited water bodies on Federal lands. This guidance was developed in collaboration with the EPA, ODEQ, and the Washington Department of Ecology. The protocol uses a three-pronged approach to address water quality problems on Federal lands: a set of goals, a seven-component strategy, and a decision framework.

The BLM uses this protocol to fulfill the agency's CWA responsibilities and provide assurance that management activities in 303(d) listed waterbodies will contribute to the maintenance of good water quality or restoration of poor water quality. This assurance is provided by documenting and implementing sufficiently stringent management measures during the planning and NEPA process and by developing and implementing water quality restoration plans. The management prescriptions in a water quality restoration plan are drawn from Federal standards, guidelines, and BMP's. The prescriptions in a water quality restoration plan apply only to Federal lands. Appendix F3 describes the LRA strategy for developing water quality

Table 2-17.—1998 State of Oregon water quality impaired stream reaches on LRA-administered lands

Subbasin	State identification	Waterbody	Parameter of concern
Summer Lake	OR42A-SILV0-1998	Silver Creek	Temperature
Summer Lake	OR42A-SIWF0-1998	Silver Creek, West Fork	Temperature
Lake Abert	OR42B-CHEW0-1998	Chewaucan River	Temperature
Lake Abert	OR42B-CHEW27.5-1998	Chewaucan River	Temperature, biological criteria
Lake Abert	OR42B-WILL0-1998	Willow Creek	Temperature
Warner Lakes	OR42C-CAMA0-1998	Camas Creek	Temperature
Warner Lakes	OR42C-DEEP0-1998	Deep Creek	Temperature
Warner Lakes	OR42C-DRAK0-1998	Drake Creek	Temperature
Warner Lakes	OR42C-FIFT0-1998	Fifteenmile Creek	Temperature
Warner Lakes	OR42C-HONE0-1998	Honey Creek	Temperature
Warner Lakes	OR42C-PARS0-1998	Parsnip Creek	Temperature
Warner Lakes	OR42C-SNYD0-1998	Snyder Creek	Temperature
Warner Lakes	OR42C-TWEL0-1998	Twelvemile Creek	Temperature
Warner Lakes	OR42C-TWEN0-1998	Twentymile Creek	Temperature
Goose Lake	OR42D-CRAN0-1998	Crane Creek	Temperature

restoration plans.

Groundwater

Groundwater is particularly valuable in the planning area because of the limited surface water. Regional groundwater gradients and aquifer systems have not been extensively studied. Groundwater data are limited and are based on isolated studies and well logs.

Groundwater occurs as both confined and unconfined aquifer systems. Most unconfined aquifers are located in stream valleys or associated with Pleistocene lakebeds that contain recent alluvial material, although some may exist as perched aquifers. Alluvial aquifers vary greatly in size and yield. These aquifers are important as transient storage systems to move groundwater to or from streams and the deeper confined aquifers. Some perched aquifers occur between the top of ridges and bottom of valleys and can usually be identified by the occurrence of springs above the valley bottoms.

Little is known of the real extent or depth of deep, confined bedrock aquifer systems. The EPA has not identified any sole-source aquifers in the planning area. Groundwater is used for irrigation, domestic use, and livestock use. There is some groundwater influenced by geothermal heat sources, and the springs have hot, mineralized water.

Springs and seeps occur in areas where water from aquifers reaches the surface. Some springs begin in stream channels. Others flow into small ponds or marshy areas that drain into channels. Still others flow into lakes or reservoirs. Some springs and seeps form their own channels that reach flowing streams, but most lose their surface flow to evaporation or recharge the alluvial fill.

There are a few hot springs in the planning area. These types of springs have vegetation and microbial and algal fauna that are adapted to hot, mineralized water.

Springs have been disturbed by management activities, such as livestock or wild horse grazing and watering, recreation use, and road construction. This affects the amount of water available.

Community Drinking Water

Community water systems treat and distribute water from the source, primarily underground aquifers, and deliver it to consumers. Towns, small communities, and private farm and ranch residences mainly use groundwater as their source of drinking water (see Table 2-18).

Water Rights and Uses

Demands on water resources have increased in Oregon over the past few decades. Although most early water

Table 2-18.—Community water systems identified by the U.S. Environmental Protection Agency

Subbasin	Community water system	Filtered	Population served
Summer Lake	Christmas Valley Domestic Water System	Yes	400
Summer Lake	Silver Lake Ranger Station (USFS)	Yes	60
Summer Lake	City of Paisley	Yes	315

rights were established for irrigation and mining, today's demand includes municipal water supplies, commercial and industrial supplies, and maintenance of adequate streamflows for fish, recreation, and water quality.

In Oregon, all water is publicly owned and falls under the management jurisdiction of the State of Oregon. Permits for water use from any source must be obtained from the Oregon Water Resources Department, with some exceptions. Laws pertaining to the use of surface water and groundwater are based on the principle of prior appropriation ("first in time, first in right") and limited to the quantity of water needed to satisfy the specified beneficial use without waste. That is, the first person to obtain a water right will be the senior holder on a particular stream and has priority over all junior claims in times of water shortage.

The State of Oregon recognizes instream water rights for the public benefit to maintain sufficient flows to protect recreation, fish, wildlife, and other river-related resources. Instream water rights are applied for by the ODEQ, the Department of Parks and Recreation, and the Department of Fish and Wildlife to the State's Water Resource Commission. The priority date for instream water rights is the date the application is submitted to the Oregon Water Resources Department.

Current BLM and Department of Interior (DOI) policy is to use the State's instream flow water right process to preserve flow-dependent values for any stream designated as a wild and scenic river (WSR). The "National Wild and Scenic Rivers Act" (Public Law 90-542) specifically reserves the minimum quantity of water necessary to maintain the values for which the river was designated. A Federal reserved water right is authorized by the Act, and the priority date for each river segment is the date of designation. A Federal reserved water right would only be exercised if the State's appropriative instream water right process is inadequate to protect the designated values of the river. Current DOI policy provides latitude to cooperate with state natural resource agencies to achieve resource protection objectives prior to exercising a reserved water right. This in no way abrogates the Federal reserved water right.

Additionally, Federal reserved water rights may be applied to important springs and waterholes pursuant to "Public Water Reserve No. 107, Executive Order of April 17, 1926," under the authority of section 10 of the "Stock-Raising Homestead Act of December 29, 1916." Public Water Reserve 107 reserves only the minimum amount of water necessary to accomplish the primary purpose of the reservation. There was no intent to reserve the entire yield of each public spring or waterhole withdrawn by the Executive order. The purposes for which these waters were reserved are limited to domestic human consumption and livestock watering on public lands. All waters from these sources in excess of the minimum amount necessary for these limited public watering purposes are available for appropriation through State water law and administrative claims procedures.

There are over 900 existing water storage impoundments, pipeline systems, groundwater wells, and irrigation diversions on public lands within the planning area that have State-approved water rights. The availability of water in much of the area is limited and may hamper additional developments that are water dependent. Future development for rangeland projects for wildlife, recreation, and livestock would require a State of Oregon water right before project implementation could occur.

The information presented in Table 2-19 is a summary developed by the EPA (URL: <http://water.usgs.gov/cgi-bin/wuhuc?huc=17120005>) on the 1990 USGS water use for thermoelectric power, mining, livestock (stock and animal specialties), irrigation, hydroelectric power, wastewater treatment, and reservoir evaporation. Further information can be found at the web site.

Fish and Aquatic Habitat

Introduction

Fisheries habitat includes perennial and intermittent streams, springs, lakes, and reservoirs that support fish through at least a portion of the year.

The condition of fisheries habitat is related to hydro-

Table 2-19.—1990 water use by category and subbasin

Category	Summer Lake	Lake Abert	Warner Lakes	Guano
Total withdrawals				
Groundwater (mgal/d) ¹	82.78	2.62	1.59	5.68
Surface water (mgal/d)	77.90	166.81	201.24	55.98
Total	160.68	169.43	202.83	61.66
Total population served by subbasin	1,320	480	360	40
Number of public supply facilities	3	0	0	0

¹ mgal/d = one million gallons per day.

logic conditions of the upland and riparian areas associated with, or contributing to, a specific stream or waterbody, and to stream channel characteristics.

Riparian vegetation reduces solar radiation by providing shade and thereby moderates water temperatures, adds structure to the banks to reduce erosion, provides overhead cover for fish, and provides organic material, which is a food source for macroinvertebrates. Intact vegetated floodplains dissipate stream energy, store water for later release, and provide rearing areas for juvenile fish. Water quality (especially factors such as temperature, sediment, and dissolved oxygen) also greatly affects fisheries habitat.

Habitat quality varies by stream reach, with canyons generally being in better condition due to inaccessibility to livestock and rock armoring. In these reaches, pool quality and quantity are usually good, and channel condition is not dependent on vegetation. On less confined, deep-soil reaches, vegetation plays more of a role controlling habitat conditions that vary depending on past and present management. Generally, the condition of these sites has improved in the planning area over the last 20 years as a result of livestock management and exclusion. Some sites were degraded to the point that many years will be required for the streams to improve to a functional state. Large wood, while not meeting standards in the 1995 “Inland Native Fish Strategy” (USDA-FS 1996c), is usually not a factor in determining function of the streams. Most sites on BLM-administered land naturally do not have an adequate source of large wood.

Public land provides habitat for nine native fish species (Table 2-20), four of which are federally listed under the “Endangered Species Act.”

Several nonnative fish have been introduced into the planning area. Currently, outside of some small reservoirs in the planning area, the Oregon Department

of Fish and Wildlife (ODFW) liberates hatchery trout only in Ana river.

ICBEMP rated the aquatic integrity of the subbasins throughout the project area. An aquatic system that exhibits high integrity has a mosaic of well-connected, high-quality water and habitats that support a diverse assemblage of native and desired nonnative species, the full expression of potential life histories, dispersal mechanisms, and the genetic diversity necessary for long-term persistence and adaptation in a variable environment. Subbasins exhibiting the greatest level of these characteristics were rated high, and those exhibiting the least were rated low. The Guano Subbasin was rated as having moderate aquatic integrity, while the other three subbasins in the planning area, Warner Lakes, Lake Abert, and Summer Lake, were rated as having low aquatic integrity. Subbasins with low aquatic integrity may support populations of key salmonids or have other important aquatic values (that is, threatened or endangered species, narrow endemics, and introduced or hatchery-supported sport fisheries). In general, however, these watersheds are strongly fragmented by extensive habitat loss or disruption throughout the component watersheds, and most notably through disruption of the mainstem corridor. Although important and unique aquatic resources exist, they are usually localized (USDI-BLM and USDA-FS 1996h). Appendices A1 and A2 of the Draft RMP/EIS contain a summary of the ICBEMP assessment applicable to the planning area. These findings are further discussed in the Water Resources section.

Species and Habitat

Trout

There are no anadromous salmonids (such as salmon and steelhead that return from saltwater to spawn) in the planning area. Redband trout, a relative of rainbow

Table 2-20.—Native fish of the Lakeview Resource Area

Common name	Scientific name	Status
Warner sucker	<i>Catostomus warnerensis</i>	Federal threatened
Foskett speckled dace	<i>Rhinichthys osculus</i> ssp.	Federal threatened
Hutton tui chub	<i>Gila bicolor</i>	Federal threatened
Great Basin redband trout (several subspecies)	<i>Oncorhynchus mykiss</i> ssp.	
Tui chub (several subspecies)	<i>Gila bicolor</i>	
Modoc sucker	<i>Catostomus microps</i>	Federal threatened
Goose Lake sucker	<i>Catostomus occidentalis lacusanserinus</i>	
Pit brook lamprey	<i>Lampetra lethophaga</i>	
Speckled dace	<i>Rhinichthys osculus</i>	

trout, is the native trout. These trout occur in nearly all perennial streams (consisting of approximately 60 miles on BLM-administered land) of the Warner Lakes, Goose, Lake Abert, and Summer Lake Subbasins. These subbasins make up four of six separate desert basin populations of interior native redband trout (Behnke 1992).

Redband trout evolved in Pleistocene lakes and moved into mid- to high-elevation streams that did not have water outlets to the ocean as the climate became drier and warmer in portions of Oregon, Nevada, and Utah. Redband trout are generally more tolerant of higher temperatures than are planted rainbow trout. The introduction of hatchery-raised rainbow trout as early as 1925 may have altered many of the unique characteristics of the native redband. Brook trout have competed for limited resources with redband. However, brook trout are known to occur only on the upper reaches of streams on private and Fremont Forest lands; they have only occasionally been found in the lower Chewaucan River on BLM-administered lands in the resource area.

In September 1997, a petition to list the Great Basin redband trout as threatened was filed. This petition included the four subpopulations in the LRA. After considering all available information and analyzing public comment, the USFWS determined that listing the species was not warranted (USDI-USFWS 2000). The BLM will pursue activities to improve conditions for redband trout to help prevent the need to list the species. Amphibians and aquatic invertebrates are integral components of the fish community. One amphibian, the Columbia spotted frog, is a candidate for listing under the “Endangered Species Act.”

Neither rainbow nor brook trout are native to the Great Basin. Brook trout, which evolved east of the Rocky Mountains, were introduced for sport fisheries. Hatch-

ery rainbow may have come from coastal streams. Neither the extent of the loss of genetic purity nor the locations of the most pure strains of redband are known. Stocked rainbow trout are less able to survive the high temperatures and low oxygen levels of the local streams. Generally speaking, stocking any type of trout on BLM land has been discontinued except for the stocking done by ODFW in Sid Luce, Big Rock, Lucky, Sunstone, Sherlock, Spaulding, Duncan, Squaw Lake, Friday, Mud Lake, and MC Reservoirs. In most of these reservoirs, spawning habitat is lacking and natural reproduction does not occur.

Cutthroat trout occur in the resource area only in Guano Creek. They were introduced in 1957. The early introductions were from Lahontain stock, but subsequent introductions from other stocks have altered the Lahontain genetic pattern of these fish. Guano Creek is intermittent; that is, it flows only in response to rain or snowmelt. Therefore, the trout are found only during spring runoff and in the longer lasting pools on the Shirk Ranch. They survive in the perennial reaches of the stream on Hart Mountain Refuge and in Jacobs Reservoir.

Warner Sucker (Listed Threatened)

Warner suckers (*Catostomus warnerensis*) are endemic to the Warner Valley and were listed as a threatened species in 1985. There are 43 miles of designated critical habitat in the resource area, including 13.5 miles of designated habitat on BLM-administered lands.

Biological evaluations (see Glossary) on the effects of grazing on Warner suckers were completed in 1994 by the BLM. On those pastures with “may effect” or “likely to adversely effect” determinations from the evaluations, consultation between the BLM and USFWS, in compliance with section 7 of the “Endan-

Table 2-21.—Allotments and pastures under consultation for effect to Warner suckers

Allotment	Pasture/Stream
Fish Creek (0519)	Deppy (Honey and Twelvemile Creeks)
Hickey Individual (0202)	Parsnip Seeding; Camas Riparian (Parsnip and Camas Creeks)
Lane Plan I (0207)	Juniper Lake (Twentymile Creek)
Lane Plan II (0206)	Parsnip Riparian; Thompson (Parsnip and Drake Creeks)
Rahilly/Gravelly (0212)	Horse Creek (Twelvemile and Horse Creeks)
Round Mountain (0211)	North; West (Twentymile, Twelvemile, and Fifteenmile Creeks)
Sagehen (0208)	Riparian (Deep and Camas Creeks)
Vinyard (0201)	Squaw Flat; Seeding (Deep Creek)

gered Species Act,” has been completed (Table 2-21). Where noncompliance with the terms and conditions of the biological opinion has occurred or changes were made to the actions proposed in the original consultation, the consultation process has been reinitiated. Biological evaluations and reinitiation of the consultation are completed as needed on all Federal actions taken by the BLM in the Warner Watershed south of Bluejoint Lake. Besides the grazing program, consultations have been completed on several fence construction projects, noxious weed control, road construction, waterhole maintenance, prescribed fire, commercial recreation permits, and a wetland management plan.

A recovery plan for the Warner sucker was approved in 1998 (USDI-USFWS 1998). It included descriptions, life histories, distribution, reason for decline, current conservation efforts, and recovery strategy of the species. Most importantly, it lists what actions must be completed to remove the species from the endangered species list. Many of the actions required to remove the species from listing, such as screening and providing passage over irrigation diversions, are needed on private lands and are beyond the scope of this plan. The BLM has worked on determining the population status of the species to establish the self-sustaining metapopulation requirements of the plan. BLM has also worked to identify existing habitats, assess their quality, and improve habitats by managing and excluding livestock.

Foskett Speckled Dace (Listed Threatened)

The Foskett speckled dace (*Rhinichthys osculus* ssp.), listed as threatened in 1985, occurs in a spring on BLM-administered land in Coleman Valley. The BLM acquired this land in an exchange with the private land owner and has maintained livestock exclusion on the spring area. Work, as outlined in the recovery plan (USDI-USFWS 1998), is planned to enhance the dace habitat and to reestablish the fish in an adjacent spring.

Hutton Tui Chub (Listed Threatened)

The Hutton tui chub (*Gila bicolor*) was listed as threatened in 1985 and inhabits a privately-owned spring along the shore of Alkali Lake. The landowner has excluded grazing from the spring and has restricted public access to the spring in an effort to protect the chub habitat. BLM management actions around the spring are not likely to impact this species but are evaluated to assure no adverse effect. This species is also covered by a recovery plan (USDI-USFWS 1998).

Other Aquatic Species

Amphibians and aquatic invertebrates are integral components of the fish community. One amphibian, the Columbia spotted frog, is a candidate for Federal listing.

Other fish of concern, because of limited habitat and range, include Sheldon tui chub (*Gila bicolor* spp.) in the Guano Basin, Summer Basin tui chub (*Gila bicolor* spp.) in the Summer Lake Basin and Oregon Lakes, and XL tui chub (*Gila bicolor* spp.) in the Chewaucan Basin.

ODFW no longer routinely stocks warmwater fish species, but largemouth bass, black crappie, white crappie, and brown bullhead have become established from previous introductions in the Warner Lakes and some smaller reservoirs. Anglers illegally introduced these species in other reservoirs in the planning area.

Cowhead tui chub (*Gila bicolor vaccaceps*): Occur in a limited range in northern California on a tributary of Twelvemile Creek. This species was proposed for listing, but the listing was postponed as a result of the development of a conservation agreement between the USFWS and the private landowners that manage the chub habitat. Because the LRA is downstream from this species' habitat, management actions by the

Lakeview BLM will have no effect on this species. Management actions proposed in adjacent areas will be evaluated to assure they will have no adverse effect to the species.

Columbia spotted frogs (*Rana lutiventris*): Are a Federal candidate species and are known to occur in two locations in the Warner Basin. It is suspected these frogs occur in other locations but none have been located. This species may be considered for Federal listing in the future.

Spring snails (*Pristinicola* sp., *Pyrgulopsis* sp. and others): Occur in several springs scattered around the LRA. They tend to be endemic to the spring in which they occur. Some species have been described (i.e., XL and Abert), but many others have yet to be identified as unique.

Management Needs

Habitat Connectivity, Strongholds, and Refugia

The watersheds that supply the majority of water to the Warner Valley are identified as refugia and strongholds for Warner suckers and redband trout. Deep, Twelvemile, Twentymile, and Honey Creek Watersheds all contain a considerable amount of BLM-managed lands and streams that provide habitat to significant fish species, including Warner suckers and redband trout. The perennial waters of the Twelvemile, Twentymile (except Horse and Fifteenmile Creeks), and Honey Creek Watersheds provide habitat for Warner suckers. All of the perennial reaches of Twelvemile and Twentymile Creeks in Oregon have been identified as critical habitat for Warner suckers. These sucker-bearing streams, along with Horse Creek, Fifteenmile Creek and the perennial streams of the Deep Creek Watershed provide habitat for redband trout.

The major factor limiting fish habitat is a lack of connectivity to the Warner Lakes. Deep and Twentymile Creeks have had substantial modifications and diversion that limit upstream movement to the upper reaches of the stream. Due to a natural falls on Deep Creek, only 2.3 miles of stream between Adel and the falls is affected by the connectivity concern. There are two major obstacles on Twentymile and three on Deep Creek. Honey Creek has the most direct connection between the stream and the Warner Lakes; however, there are several diversions that need to be modified to reestablish connectivity. All of these diversions are privately operated and all but one are on private land. The BLM has acted as a partner facilitat-

ing passage and screening programs to restore connectivity on the Warner Valley Watersheds, but the ultimate responsibility for work lies with the private owner. Culvert passage is not an issue in the planning area.

Water Quality Management Plans

Delineation of refugia and strongholds, as well as consideration of cold-water refugia will be an integral part of future water quality management plans. As total maximum daily loads are developed, they will address cold-water refugia, as required in the proposed EPA rules. The BLM will continue to be an active member of watershed councils and advisory groups to help tie the concept of connectivity, watershed management, and water quality plans together during the SB1010 process.

Future Management Needs

Watershed programs will be implemented or continued to restore watershed health. Juniper management and prescribed fire are needed in many areas to improve ground cover and watershed function. Grazing management on the Warner Valley Watersheds has been effective at improving upland and riparian conditions, but continued implementation and effectiveness monitoring is critical. Some instream work will be required to stabilize headcuts, establish flood plain function, and minimize impacts from roads.

Past Management Activities

Many past activities have affected the habitat conditions for fish in the area. Road construction has altered the ability of many streams to access their full floodplain or has constricted their floodplain and has straightened or constricted many channels, resulting in channel incision. Logging and associated road construction have removed overstory cover on many watersheds, changing peak and base flows downstream. Grazing has removed bank stabilizing vegetation and impacted banks directly. Water withdrawal since the turn of the century has affected the ability of fish to thrive in many streams. Irrigation water withdrawn from the major streams in the area reduces summer flows and raises water temperature. Channeling streams to better control the spread of water and removing of willows to create irrigated pasture and hay fields have resulted in channel incision and loss of habitat. Diversions often block upstream movement of trout from the lower reaches of streams and lakes to upper spawning areas. The inability of fish to move from Hart Lake into Honey Creek and from Crump

Table 2-22.—Livestock management for lotic riparian protection/enhancement

Stream	Exclusion areas		Pasture management	
	Number	Stream miles (public/private)	Number	Stream miles (public/private)
Twentymile Creek	2	5.5/0	1	2.0/0
Twelvemile Creek	1	6.5/2.0	0	0
Fifteenmile Creek	5	2.5/0.75	1	2.5/0
Horse Creek	1	0/1.0	1	2.7/0.5
Honey Creek	2	4.25/4.5	0	0
Snyder Creek	2	1.5/0.5	0	0
Twelvemile Creek	1	2.25/0.25	0	0
Deep Creek	1	6.0/0	2	3.25/4.5
Camas Creek	2	2.25/0	1	1.5/0
Drake Creek	2	1.75/0	1	3.4/0
Parsnip Creek	1	1.0/0	1	1.5/0
Chewaucan River	0	0	1	3.25/0.75
Dicks Creek	0	0	1	0.5/0
Willow Creek	3	2.0/0	1	0.5/0.75
Guano Creek	1	9.75/0	0	0
Silver Lake drainage				
Buck Creek	2	2.25/0	0	0
Bridge Creek	1	0.25/0	2	1.0/0
Silver Creek	1	0.5/0	1	1.5/0
West Fork Silver Creek	0	0	1	2.0/0
Duncan Creek	1	0.5/0	1	2.25/0

Lake into Twentymile Creek is an example of this problem.

Active riparian management in the resource area has been initiated on nearly all perennial and many intermittent streams. Table 2-22 depicts the stream and the type of management that occurs on it. Some exclusions have been successful at controlling grazing use, while in others, grazing still occurs when livestock occasionally find their way through the exclusion fences. With the initiation of consultation with USFWS under section 7 of the “Endangered Species Act,” more extensive efforts in locating unauthorized grazing use and construction of additional fencing has made most of the exclusions in the Warner Basin more effective. The resource area has initiated grazing management on 14 pastures to improve riparian conditions. When grazing occurs as directed by the BLM, management on these pastures has been successful in improving habitat conditions.

Aquatic habitat surveys using the “Alaskan Aquatic Resource Information Management System” were

completed in 1996 and 1997 on all of the perennial fish-bearing streams on the LRA (Table 2-23). The Fremont National Forest completed many surveys on forest lands during these years as well. While much of the data collected from these surveys has yet to be analyzed, analysis of the data used in the “Deep Creek Watershed Analysis” (USDA-FS and USDI-BLM 1998b) indicated that stream temperature was the major limiting factor on the watershed’s streams, resulting in a generally poor overall rating on most stream reaches. Temperatures greater than the State standard are the result of several factors, including water withdrawal, loss of streamside vegetation, channel widening, and lower summer flows. ODEQ is currently reviewing water quality standards (including temperature) for coldwater fisheries habitat in eastern Oregon. Revised standards could be available within the next 5 years. Stream channel entrenchment has prevented water storage in floodplain soils, thereby reducing water storage that would promote longer-duration streamflow and reduced or eliminated interflow between cool/cold underground waters in the riparian area (floodplain) and surface streamflow. Even under pristine condi-

Table 2-23.—Warner Valley stream survey summary

Stream	Reach	Length (miles)	Pools/mile	Pools>2.6/mile	LWD/mile ¹	% Unstable banks	Rosgen type ²	% public/private
Twelvemile Creek	6	1.58	17.8	4.4	31.7	1.9	B3	100/0
Twelvemile Creek	5	2.10	12.8	3.3	0.5	19.7	C4	76/24
Twelvemile Creek	4	1.23	10.6	6.5	0.8	5.5	B4c	100/0
Twelvemile Creek	3	2.01	17.9	13.4	9.0	2.9	B2c	100/0
Twelvemile Creek	2	0.99	36.4	20.2	5.0	0.4	B3	55/45
Twelvemile Creek	1	0.89	12.3	4.5	0	3.4	F3	0/100
Fifteenmile Creek	4	2.49	14.1	0.0	4.0	2.5	E/C/B-15/10/65%	100/0
Fifteenmile Creek	3	1.05	31.5	0.0	49.7	28.0	C5/B4-50/50%	24/76
Fifteenmile Creek	2	2.69	54.0	1.1	26.1	5.6	B4	100/0
Fifteenmile Creek	1	0.26	38.7	7.7	23.2	0.0	A2a+	100/0
Twentymile Creek	1	0.87	41.4	4.6	4.6	6.0	A3	100/0
Horse Creek	4	0.84	33.3	4.8	2.4	23.3	C4	100/0
Horse Creek	3	0.98	32.7	9.2	1.0	0.5	C4b	100/0
Horse Creek	2	1.04	22.1	13.5	3.8	38.0	C4	0/100
Horse Creek	1	0.78	67.6	5.1	0.0	2.5	A2	23/77
Horse Tributary	1	0.96	12.5	1.0	0.0	0.0	C5	100/0
Honey Creek	4	1.15	32.1	2.6	0.0	8.6	B4c	100/0
Honey Creek	3	1.03	24.3	4.9	1.9	12.5	B3c	20/80
Honey Creek	2	1.07	32.6	3.7	0.0	0.9	B4	0/100
Honey Creek	1	4.23	35.7	3.5	0.7	0.7	B3c	79/21
Snyder Creek	2	0.27	107.0	7.4	3.7	2.3	B4	100/0
Snyder Creek	1	1.71	41.5	3.5	0.0	0.6	C5/B3-50/50%	65/35
Twelvemile, Honey Creeks	2	1.89	8.5	0.0	0.0	4.2	B3c	100/0
Twelvemile, Honey Creeks	1	0.81	37.2	1.2	1.2	1.7	A3	75/25
Deep Creek	6	0.65	20.0	1.5	1.5	27.0	B4c	100/0
Deep Creek	5	1.95	39.5	7.2	3.6	29.0	B3a	100/0
Deep Creek	4	0.65	20.0	1.5	13.0	13.0	B2c	100/0
Deep Creek	3	1.92	10.4	2.6	0.0	31.0	c2	100/0
Deep Creek	2	0.84	25.1	4.8	0.0	28.0	B3c	100/0
Deep Creek	1	1.66	33.7	11.4	0.6	34.0	B3c	100/0
Drake Creek	6	0.51	66.1	1.9	11.7	20.0	B4c	100/0
Drake Creek	5	1.09	39.4	1.8	22.0	6.0	B2	100/0
Drake Creek	4	1.35	27.4	0.7	8.1	19.0	B3c	100/0
Drake Creek	3	0.14	29.0	0.0	0.0	1.0	C4	100/0
Drake Creek	2	0.09	42.4	21.2	0.0	0.0	B2c	100/0
Drake Creek	1	0.97	37.0	7.2	8.2	2.0	B3c	100/0
Roar Springs Creek	2	0.36	27.4	0.0	5.5	0.0	C5	100/0

Stream	Reach	Length (miles)	Pools/mile	Pools>2.6/mile	LWD/mile ¹	% Unstable banks	Rosgen type ²	% public/ private
Roar Springs Creek	1	0.28	28.6	0.0	57.2	2.0	B4	100/0
Parsnip Creek	5	0.43	58.5	4.7	18.7	9.0	B4a	100/0
Parsnip Creek	4	0.98	52.8	0.0	2.0	19.0	C4	100/0
Parsnip Creek	3	0.19	56.4	10.3	0.0	1.4	E6	100/0
Parsnip Creek	2	0.64	45.4	0.0	9.4	21.0	C5	100/0
Parsnip Creek	1	0.63	79.7	8.0	0.0	32.0	F4	100/0
Camas Creek	3	0.41	24.6	4.9	12.3	1.0	B4c	100/0
Camas Creek	2	1.71	28.0	4.7	0.0	34.0	C4	100/0
Camas Creek	1	1.53	47.8	5.2	1.3	7.0	B3	100/0

¹ Large woody debris (see Appendix F2).² Channel type description (Rosgen 1996).

tions, it is unlikely State standards for temperature could be achieved on BLM stream reaches. However, most other elements (pools per mile, large wood per mile, pools per mile greater than 2.6-feet deep, unstable banks, proper functioning condition rating, and sediment rating) were good to fair with some poor ratings.

While most stream conditions provide adequate habitat for suckers and trout, there are opportunities to enhance some habitat components. Deep pools may be created and stream width-to-depth ratios may be reduced with structural controls. Other projects could be implemented that would improve cover and forage areas. Management actions, including grazing control and instream projects, could be initiated to improve temperature conditions by channel narrowing and overstory vegetation establishment.

Wildlife and Wildlife Habitat

BLM is responsible for managing of a wide array of both native and introduced wildlife habitats. In general, the ODFW is responsible for managing animal populations. However, an animal is inseparable from its habitat, and any management strategies must consider both the animal and its habitat.

Table 2-26 depicts existing wildlife forage allocations which are based on the dietary preferences of cattle and do not necessarily reflect the food resources available for wildlife consumption. The existing allocations were completed 20 years ago and do not represent the current distribution of wildlife within the resource area. Deer and pronghorn use has changed since the original allocation, and elk and bighorn sheep have expanded into new ranges. The Other Wildlife category on Table 2-26 has been modified to include raptors, small mammals, birds, and important shrub-steppe species, such as greater sage-grouse.

Numerous species of wildlife occur in the LRA. However, only priority species or taxa and their associated habitats are discussed here. These animals are recognized as being of particular interest to the public and are generally the emphasis for management. A subset of the priority taxa will be highlighted to provide background information and specific management opportunities relative to them. Special status species are discussed in the following section.

The planning area includes a number of priority habitats where the BLM focuses most management efforts. These habitats are the major plant communities or terrestrial features that are important to wildlife and

include wet meadows, dry meadows, playa and lakebeds, cliffs and caves, talus slopes and lavabeds, brushfields, and forests and woodlands.

Ongoing changes to these important plant communities, many of them caused by humans, have resulted in alterations to the animal habitat within the planning area. For example, juniper encroachment is converting shrublands to woodlands, primarily because of changes in natural fire regimes. Quaking aspen stands are not regenerating themselves and are diminishing in numbers. A complete description of priority wildlife habitats found in the planning area is contained in Appendix H2.

Special Status Animal Species

Special status species are designated by Bureau 6840 policy. A listing of special status species was developed using the following criteria: Federal threatened, Federal endangered, proposed threatened, proposed endangered, and BLM special status species. Table 2-24 lists the priority species in the planning area and the reason for priority consideration, and Table 2-25 lists Bureau sensitive species known or suspected to occur in the LRA. There are three categories of special status species, (1) Bureau sensitive, (2) Bureau assessment, and (3) Bureau tracking. Bureau sensitive species are those that could easily become endangered or extinct. Bureau assessment species are those not presently eligible for official Federal or state status, but are of concern in Oregon. Bureau tracking species are those that may become a species of concern in the future. These species occur in many of the priority habitats on the resource area, including streamside riparian, seasonal wetlands, playas and lakebeds, cliffs, talus slopes, wet meadows, dry meadows, dryland shrub, juniper woodlands, and ponderosa pine forests. A complete description of special status species is contained in Appendix H.

Livestock Grazing Management

Introduction

The “Taylor Grazing Act” was passed on June 28, 1934, to protect public lands and their resources from degradation, to provide orderly use to improve and develop public rangelands, and to stabilize the livestock industry. Following various homestead acts, the “Taylor Grazing Act” established a system for allotting

Table 2-24.—Priority animal taxa

Common name	Scientific name	Status ¹
Amphibians and Reptiles		
Columbia spotted frog	<i>Rana luteiventris</i>	FC
Northern sagebrush lizard	<i>Sceloporus graciosus graciosus</i>	SOC
Birds		
Bald eagle	<i>Haliaeetus leucocephalus</i>	FT
Black tern	<i>Chlidonias niger</i>	SOC
Columbian sharp-tailed grouse	<i>Tympanuchus phasianellus columbianus</i>	SOC
Ferruginous hawk	<i>Buteo regalis</i>	SOC
Greater sage-grouse	<i>Centrocercus urophasianus phaios</i>	SOC
Northern pygmy owl	<i>Glaucidium gnoma</i>	HI
Northern goshawk	<i>Accipiter gentilis</i>	SOC
Olive-sided flycatcher	<i>Contopus cooperi borealis</i>	SOC
Peregrine falcon	<i>Falco peregrinus anatum</i>	SOC
Western Burrowing owl	<i>Athene cunicularia hypugea</i>	SOC
Western least bittern	<i>Ixobrychus exilis</i>	SOC
White-faced ibis	<i>Plegadis chihi</i>	SOC
Fish		
Catflow tui chub	<i>Gila bicolor</i> ssp.	SOC
Cowhead tui chub	<i>Gila bicolor</i> spp.	HI
Foskett speckled dace	<i>Rhinichthys osculus</i> ssp.	FT
Goose Lake lamprey	<u><i>Lampetra tridentata</i></u>	SOC
Goose Lake sucker	<i>Catostomus occidentalis lacusanserinus</i>	SOC
Goose Lake redband trout	<i>Oncorhynchus mykiss</i> ssp.	SOC
Hutton Springs tui chub	<i>Gila bicolor</i> ssp.	FT
Interior redband trout	<i>Oncorhynchus mykiss gibbsi</i>	SOC
Oregon Lakes tui chub	<i>Gila bicolor oregonensis</i>	SOC
Pit roach	<i>Lavinia symmetricus mitrulus</i>	SOC
Sheldon tui chub	<i>Gila bicolor eury soma</i>	SOC
Summer Basin tui chub	<i>Gila bicolor</i> ssp.	SOC
Warner sucker	<i>Catostomus warnerensis</i>	FT
Warner Valley redband trout	<i>Oncorhynchus mykiss</i> ssp.	SOC
Invertebrates		
Abellan hydropsychyche caddisfly	<i>Hydropsyche abella</i>	SOC
Montane peaclam	<i>Pisidium ultramontanum</i>	SOC

Common name	Scientific name	Status ¹
Mammals		
California bighorn sheep	<i>Ovis canadensis californiana</i>	SOC
California wolverine	<i>Gulo gulo luteus</i>	SOC
Canada lynx	<i>Lynx canadensis</i>	FT
Long-eared myotis (bat)	<i>Myotis evotis</i>	SOC
Long-legged myotis (bat)	<i>Myotis volans</i>	SOC
Mule deer	<i>Odocoileus hemionus</i>	HI
Pale western big-eared bat	<i>Corynorhinus townsendii pallescens</i>	SOC
Pronghorn	<i>Antilocapra americana</i>	HI
Pygmy rabbit	<i>Brachylagus idahoensis</i>	SOC
Rocky Mountain elk	<i>Cervus elaphus</i>	HI
Small-footed myotis (bat)	<i>Myotis ciliolabrum</i>	SOC
Yuma myotis (bat)	<i>Myotis yumanensis</i>	SOC

¹ Abbreviations: FT = Federal threatened; FC = Federal candidate; HI = high public interest, and SOC = USFWS species of concern.

grazing privileges on Federal land to livestock operators based on grazing capacity and use priority, and for the characterization of allotment boundaries. The Act also established standards for rangeland improvements and implemented grazing fees. Approximately 142 million acres of land in western states were under the jurisdiction of the Grazing Service and Federal Land Office, which evolved into the BLM in 1946. The “Federal Land Policy and Management Act” (FLPMA) was passed in 1976, and the “Public Rangelands Improvement Act” (PRIA) passed in 1978. These also provide authority for managing grazing on public lands.

Livestock Grazing

Authorization

Livestock grazing is administered on 120 allotments in the LRA. Existing allotment boundaries are illustrated on Map G-1 of the Draft RMP/EIS. Information specific to each of the 120 allotments in the planning area is provided in Appendix E1 and is summarized in Table 2-26. A total of 69 permittees are currently authorized to graze livestock in these allotments under section 3 of the “Taylor Grazing Act.” Five permittees are authorized to graze livestock in parcels included under section 15 of the Act. Total active preference of all permittees in the planning area is 164,128 animal unit months (AUM’s). For comparison, the total number of AUM’s of grazing use for each of the last 10 years is shown in Table 2-27.

In accordance with rest rotation grazing system objec-

tives, not all public land in grazing allotments is used every year. In order to promote healthy rangelands, specific pastures are designed to be rested from livestock use. Known problems pertaining to livestock grazing are not related to existing forage allocations, but to needed changes in management, such as season of use and livestock distribution.

When additional forage (above full permitted levels) is available on public lands, temporary nonrenewable grazing use is periodically authorized for qualified applicants when such use is consistent with meeting multiple use objectives.

In the LRA, 240,535 acres of public land have been set apart from grazing allotments specifically to either (1) improve or protect resource values, or (2) they were found to be unsuitable for livestock grazing. Table 2-28 identifies land that is not allocated to livestock production and is not included in a grazing allotment. About 155,734 acres within the LRA have available forage produced annually but are not allocated to specific livestock operators. Livestock use in some of these areas is authorized on a temporary basis to provide management flexibility for livestock operators. That flexibility has been used for fire closures, poor climatic conditions, and recovery of resource values. It has also been used to rest or defer the use of other pastures or allotments so that resource values can recover. About 84,801 acres are excluded from grazing on a permanent basis.

Table 2-25.—Bureau sensitive species ¹

Common name	Scientific name	Occurrence within LRA
Amphibians and Reptiles		
Northern leopard frog	<i>Rana pipiens</i>	Unknown
Oregon spotted frog	<i>Rana pretiosa</i>	Unknown
Western pond turtle	<i>Clemmys marmorata</i>	Unknown
Birds		
Black-backed woodpecker	<i>Picoides arcticus</i>	Documented, occasional
Flammulated owl	<i>Otus flammeolus</i>	Unknown
Lewis' woodpecker	<i>Melanerpes lewis</i>	Documented, occasional
Mountain plover	<i>Charadrius montanus</i>	Unknown
Purple martin	<i>Progne subis</i>	Unknown
Red-necked grebe	<i>Podiceps grisegna</i>	Suspected, occasional
Upland sandpiper	<i>Bartramia longicauda</i>	Unknown
Western snowy plover	<i>Charadrius alexandrinus nivosus</i>	Documented
White-headed woodpecker	<i>Picoides albolarvatus</i>	Documented, occasional
Yellow rail	<i>Coturnicops noveboracensis</i>	Documented
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	Unknown
Invertebrates		
Casebeer prebblesnail	<i>Fluminicola</i> sp. nov.	Unknown
Great Basin ramshorn	<i>Vorticifex</i> sp. nov.	Unknown
Lake of the Woods prebblesnail	<i>Fluminicola</i> sp. nov.	Unknown
Modoc sideband	<i>Monadenia</i> sp. nov.	Unknown
Tigerlily prebblesnail	<i>Fluminicola</i> sp. nov.	Unknown
Mammals		
Kit fox	<i>Vulpes macrotis</i>	Documented, rare
Pacific Fisher	<i>Martes pennanti pacifica</i>	Unknown

¹ BLM sensitive species of which very little is known about their distribution, abundance, or occurrence on the resource area. Impacts to species that are known or suspected to occur on the resource area are considered in site-specific environmental assessments.

Additional areas (encompassing 472,890 acres) within livestock grazing allotments have limited use based on prior agreements or decisions. Limiting use or excluding livestock protects resource values or facilities from livestock-related impacts. Examples of such resource values and facilities include, but are not limited to, developed water sources, riparian communities, streams, reservoirs, springs and wetlands; wilderness study areas (WSA's), special status plant or animal habitats, relevant and important values for which ACEC's are designated; research and study plots; and administrative, recreation, and archaeological sites.

Standards for Rangeland Health and Grazing Management Guidelines

The 1996 rangeland reform process modified the grazing regulations identified in 43 CFR part 4100. A new regulation was developed and is currently being implemented throughout the BLM. The regulation, 43 CFR 4180, addresses the fundamentals of rangeland health. In August 1997, the standards and guidelines that were developed in consultation with the Southeast Oregon Resource Advisory Council and Provincial Advisory Committees, Native Americans, and others, were approved by the Oregon State Director for Oregon/Washington (USDI-BLM 1997a). These

Table 2-26.—Forage allocation and allotment summary

Allot- ment number	Allotment name	MIC 1999	Public land acres	Other acres	Animal unit months (AUM's)										Period of use ⁴	Grazing system ⁵	AMP Date	Allot- ment eval- uation	Manage- ment objec- tive ⁶
					Current deer/ prong- horn	Addi- tional deer/ prong- horn	Addi- tional elk	Addi- tional bighorn sheep	Other wildlife ¹	New wildlife total	Wild horse ²	Livestock	SNU ³						
00100	Peter Creek	M	13,800	640	25	0	30	30	5	90	0	329	0	0 Sp,Su,Fa	RR	1990		4	
00101	East Green Mountain	M	17,241	1,440	285	0	50	60	30	425	0	980	0	0 Sp,Su,Fa	RR	1993		4	
00102	Crack-in-the-Ground	I	15,419	400	133	0	40	20	10	203	0	298	0	0 Sp,Su,Fa	RR			4	
00103	ZX-Christmas Lake	I	524,180	54,640	500	0	260	20	29	809	778/408	31,069	6,588	Sp,Su,Fa	DR	2001	2001	4	
00200	Blue Creek Seeding	C	600	0	45	0	0	0	5	50	0	131	0	0 Su, Fa	Sp,Su			1,2,3,4	
00201	Vinyard Individual	I	8,600	160	100	0	10	100	12	222	0	460	0	0 Sp,Su	RR	1969	1999	1,2,3,4	
00202	Hickey Individual	M	10,906	90	163	0	30	0	17	210	0	583	0	0 Sp,Su,Fa	DR	1975	1993	1,2,3,4	
00203	O'Keefe FRF ⁷	C	565	0	1	0	9	0	1	11	0	48	0	0 Sp	Sp			1,2,3,4	
00204	Crump Individual	I	2,930	395	45	0	0	100	5	150	0	92	0	0 Sp,Su	Sp		1993	4	
00205	Greaser Drift	M	9,210	0	90	0	0	30	10	130	0	356	0	0 Fa, Wi	Fa	1999		1,3,4	
00206	Lane Plan II	I	9,910	3,330	130	0	30	0	16	176	0	450	0	0 Sp,Su	RR	1970	1993	1,2,3,4	
00207	Lane Plan I	M	24,725	1,370	180	0	30	0	20	230	0	1,942	0	0 Sp,Su,Fa	RR	1971	1993	1,2,3,4	
00208	Sagehen	M	3,820	2,050	40	0	30	0	20	90	0	266	0	0 Fa	D		1992	1,2,3,4	
00209	Schadler	C	790	0	15	0	15	0	5	35	0	57	0	0 Su,Fa	Sp,Su			1,2,3,4	
00210	Rim	M	2,376	680	10	0	0	0	5	15	0	39	0	0 Sp,Su	Sp,Su			4	
00211	Round Mountain	M	16,330	1,640	160	0	90	0	23	273	0	1,102	0	0 Sp,Su	RR	1970	1990	1,2,3,4	
00212	Rahilly-Gravelly	I	33,285	2,031	90	239	0	0	21	350	0	1,781	0	0 Sp,Su,Fa	RR	1984	1992	1,2,3,4	
00213	Burro Springs	M	7,500	0	55	0	0	20	5	80	0	279	0	0 Sp,Wi	Sp		1992	1,3	
00214	Chukar Springs	M	1,764	0	10	0	0	20	5	35	0	52	0	0 Sp	Sp			1,3,4	
00215	Hill Camp	M	30,790	2,710	270	0	0	45	30	345	0	3,932	0	0 Sp,Su,Fa	RR	1975		1,2,3,4	
00216	O'Keefe Individual	I	51,785	3,010	240	0	0	0	26	266	0	4,808	0	0 Sp,Su,Fa	RR	1989		1,3,4	
00217	Cox Individual	M	1,246	60	65	0	0	0	5	70	0	74	0	0 Sp,Su,Fa,Wi	RR	1972		1,3,4	
00218	Sandy Seeding	M	4,850	0	25	0	0	0	5	30	0	600	0	0 Sp	Sp		1993	4	
00219	Cahill FRF	C	470	0	15	0	0	0	5	20	0	280	0	0 Fa,Wi	Wi			1,3,4	
00222	Fisher Lake	M	4,230	656	45	0	0	0	5	50	0	781	0	0 Sp,Wi	Wi	1975	1992	1,3,4	
00223	Hickey FRF	C	412	0	50	0	15	0	11	76	0	64	0	0 Sp	Sp,Su		1992	4	
00400	Coglan Hills	M	12,774	0	15	105	0	40	5	175	0	117	0	0 Sp	Sp,Su			4	
00436	Diablo Peak	C	74,098	0	65	15	0	100	5	185	0/123	0	0	0 N/A	N/A			4	
00437	Abert Rim	C	14,659	0	180	0	0	180	20	380	0	0	0	0 N/A	N/A			4	
00401	Fenced Federal	C	160	520	0	10	0	0	5	15	0	16	0	0 Sp	Sp			4	

Allotment number	Allotment name	MIC 1999	Public land acres	Other acres	Animal unit months (AUM's)					Wild horse ¹	Livestock	SNU ²	Period of use ³	Grazing system ⁴	AMP Date	Allotment evaluation	Management objective ⁵
					Current pronghorn	Additional pronghorn	Additional elk	Additional bighorn sheep	Other wildlife								
00403	Pine Creek	C	400	1,160	1	0	0	0	0	0	18	0	Sp,Su	Sp			4
00404	Willow Creek	M	11,805	8,845	5	190	0	0	5	200	0	0	Sp,Su	RR			1,3,4
00406	West Clover Flat	M	748	2,776	1	0	0	0	1	2	0	0	Sp,Fa	Sp,Su			1,2,4
00407	Clover Flat	M	2,521	4,851	15	20	0	0	5	40	0	0	Sp,Su	Sp,Su			1,2,4
00408	Schoolhouse	C	55	1,980	0	1	0	0	1	2	0	0		N/A			
00409	Tucker Hill	C	3,534	323	15	0	0	0	5	20	0	0		N/A			
00410	Tim Long Creek	C	340	1,155	0	1	0	0	1	2	0	0	Sp,Su	Sp			1,4
00411	Jones Canyon	C	636	0	0	1	0	0	1	2	0	0	Sp	Sp			4
00412	Fir Timber Butte	M	3,462	3,172	20	8	0	30	2	60	0	0	Sp,Su	Sp	1992		1,4
00415	Briggs Garden	C	785	899	5	0	0	0	2	7	0	0	Sp	Sp,Su			4
00416	White Rock	C	565	438	0	0	0	0	1	1	0	0	Sp,Su,Fa	Sp,Su			4
00418	Squaw Lake	M	43,269	520	80	0	0	0	16	96	35/69	0	Sp	RR			4
00419	St. Patricks	M	23,460	1,240	50	0	0	0	3	53	58/39	0	Sp	Sp			4
00420	Egl Rim	M	21,052	0	20	0	0	0	11	31	0/14	0	Sp,Su	RR			4
00421	Rosebud	M	10,640	2,040	3	0	0	0	3	6	0	0	Wi	Wi			4
00422	Paisley Flat	M	4,549	0	15	0	0	0	5	20	0	0	Sp,Wi	Sp	1992		4
00423	Hill Field	M	4,198	1,140	0	80	0	150	10	240	0	0	Sp,Su	Sp,Su			4
00424	West Lake	M	6,886	320	0	110	0	0	10	120	0	0	Sp,Fa	Sp	1999		4
00425	Pike Ranch	M	4,560	1,600	0	2	0	0	3	5	0	0	Fa	Sp,Fa			4
00426	Five Mile Butte	I	41,815	1,216	0	105	0	100	15	220	0/45	0	Sp,Wi	Sp,Su	1992		4
00427	XL	I	37,003	190	150	0	0	0	25	175	0	0	Sp,Su,Wi	DR	1992		4
00428	Sheeprock	I	144,025	4,460	100	0	0	220	17	337	929/490	0	Sp	RR	2001		4
00429	Twin Lakes	M	17,050	0	15	120	0	0	15	150	0	0	Sp,Su	Sp,Fa	1992		4
00430	South Poverty	M	35,382	0	0	75	0	0	5	80	0	0	Sp,Su,Wi	RR	1992		4
00431	Narrows	M	8,486	180	20	0	0	100	20	140	0	0	Wi	D			4
00432	Coleman Seeding	M	5,839	0	30	0	0	0	5	35	0	0	Sp,Su	RR	1992		4
00433	East Jug	M	12,325	0	20	50	0	0	10	80	0	0	Sp,Su	D	1992		4
00435	Shale Rock	I	12,853	0	0	50	0	0	10	60	0	0	Fa,Wi	D			4
00501	FRF Flynn	C	2,780	0	50	0	0	0	5	55	0	134	Sp,Su,Fa,Wi	FRF ⁷			4
00502	FRF Fitzgerald	C	5,150	0	50	0	15	0	10	75	0	0	Sp,Su,Fa,Wi	FRF ⁷			4
00503	FRF Taylor	C	6,110	0	50	0	15	0	10	75	0	0	Sp,Su,Fa,Wi	FRF ⁷			1,2,3,4
00505	FRF Lynch	C	180	0	0	1	0	0	1	2	0	0	Sp,Su,Fa,Wi	FRF ⁷			4
00507	FRF Laird	C	2,030	0	0	1	0	0	1	2	0	0	Sp,Su,Fa,Wi	FRF ⁷			4

Allotment number	Allotment name	MIC 1999	Animal unit months (AUM's)													Allotment evaluation	Management objective ⁵
			Public land acres	Other acres	Current pronghorn	Additional deer/horn	Additional elk	Additional bighorn sheep	Other wildlife	New wildlife total	Wild horse ¹	Livestock	SNU ²	Period of use ³	Grazing system ⁴		
00508	FRF Rock Creek Ranch	C	280	0	0	1	0	0	0	1	2	0	9	0 Sp,Su,Fa,Wi	FRF ⁷		4
00509	Cox Butte	I	38,340	0	50	0	0	0	0	13	63	0	1,196	124 Sp,Su,Fa	Sp,Su	1993	3,4
00510	Orijana Rim	I	57,280	0	80	0	0	0	50	20	150	0	1,423	352 Sp,Su,Fa	Sp,Su		1,3,4
00511	Northeast Warner	I	139,019	1,680	6	538	0	120	6	670	0	6,151	234 Sp,Su,Fa	Sp,Su		1,3,4	
00512	North Bluejoint	I	22,440	3,640	80	0	0	0	0	20	100	0	289	79 Sp,Su	Sp,Su		4
00514	Corn Lake	I	78,476	1,710	30	94	0	0	0	16	140	0	2,663	1034 Sp,Su,Fa,Wi	RR		3,4
00515	Juniper Mountain	M	91,720	760	90	240	60	40	26	456	0	3,621	796 Sp,Su,Fa	RR		1,2,3,4	
00516	Rabbit Basin	M	32,211	400	0	55	0	0	5	60	0	1,846	0 Sp,Su,Fa,Wi	Sp	1993	3,4	
00517	Coyote-Colvin	I	123,038	15,002	70	913	75	30	17	1105	0	5,091	0 Sp,Su,Fa,Wi	RR	2000	3,4	
00518	Clover Creek	M	10,050	1,354	4	92	15	0	4	115	0	435	0 Su,Fa	RR	1994	1,2,3,4	
00519	Fish Creek	I	11,805	10,446	20	0	75	0	24	119	0	575	0 Sp,Su	RR		1,2,3,4	
00520	Lynch-Flynn	I	18,800	4,260	50	0	30	0	5	85	0	882	0 Sp,Su	RR		1,2,3,4	
00521	Priday Reservoir	M	780	720	120	0	5	0	19	144	0	65	35 Sp	Sp,Su		1,2,3,4	
00522	Abert Seeding	M	9,200	320	55	0	0	0	5	60	0	2,619	0 Sp,Su,Fa,Wi	RR	1968	3,4	
00523	Warner Lakes	I	38,788	5,650	40	0	0	0	10	50	0	1,138	86 Sp,Su,Fa,Wi	Wi		1,2,3,4	
00524	Lane Individual	C	2,700	0	40	0	0	40	10	90	0	65	0 Sp,Su,Fa	Wi		3,4	
00529	South Rabbit Hills	M	9,028	0	0	35	0	0	5	40	0	1,266	0 Sp,Wi	Sp	1993	1,2,3,4	
00530	East Rabbit Hills	M	8,404	0	0	35	0	0	5	40	0	1,200	0 Sp,Wi	Sp	1993		
00531	North Rabbit Hills	M	11,712	640	0	35	0	0	5	40	0	1,317	0 Sp,Wi	Sp	1993		
00600	Beaty Butte	I	506,985	68,510	400	0	0	240	44	684	3,000/2,400	26,121	14,466	RR	1998	1,2,3,4	
00700	Silver Creek-Bridge Creek	I	6,645	265	50	0	60	0	19	129	0	303	343 Sp,Su	RR	1992	1,3,4	
00701	Upper Bridge Creek	M	1,460	3,270	20	0	30	0	9	59	0	108	52 Sp,Fa	Sp,Fa	1970	1,3,4	
00702	Buck Creek-Bridge Creek	M	6,280	375	120	0	30	0	22	172	0	309	30 Sp,Su,Fa	RR		1,3,4	
00703	Bear Creek	M	1,155	990	30	0	30	0	6	66	0	118	11 Wi	Wi		1,3,4	
00704	Ward Lake	I	12,424	1,819	170	0	150	0	17	337	0	397	223 Sp	RR	1993	3,4	
00705	Oatman Flat	I	28,503	6,075	730	0	150	0	28	908	0	2,082	623 Sp,Su	RR		3,4	
00706	Rye Ranch	M	4,240	0	120	0	40	0	10	170	0	539	0 Sp,Su	DR		4	
00707	Tuff Butte	M	9,330	2,310	320	0	180	0	20	520	0	536	0 Sp,Su	RR		4	
00708	Arrow Gap	C	2,720	0	0	140	6	0	20	166	0	135	25 Sp,Su	Sp,Su		3,4	
00709	Dead Indian-Duncan	M	18,790	0	620	0	150	0	27	797	0	586	112 Sp,Su	RR		3,4	
00710	Murdock	I	4,468	1,668	60	0	60	0	12	132	0	545	160 Sp,Su	RR		3,4	
00711	South Hayes Butte	I	1,490	0	10	0	60	0	7	77	0	88	50 Sp,Su,Fa	Sp,Fa		3,4	
00712	Bridge Well	M	1,400	1,050	90	0	60	0	9	159	0	188	0 Sp	RR	1992 1990	3,4	

Allot- ment number	Allotment name	MIC 1999	Public land acres	Other acres	Animal unit months (AUM's)										AMP Date	Allot- ment eval- uation	Management objec- tive ⁵		
					Current prong- deer/ horn	Additional prong- deer/ horn	Additional elk	Additional bighorn sheep	Other wildlife	New wildlife total	Wild horse ¹	Livestock	SNU ²	Period of use ³				Grazing system ⁴	
00713	Silver Creek	M	2,785	870	50	0	60	0	0	12	122	0	200	0	Sp	RR	1992	1990	3,4
00714	Table Rock	C	4,110	120	160	0	6	0	0	13	179	0	1	250		Ungrazed			3,4
00716	Silver Lake Lakebed	C	680	0	0	25	0	0	0	5	30	0	1	0	Wi	Wi			3,4
00900	Fremont	M	26,362	511	1,200	0	60	0	0	29	1289	0	1,970	0	Sp,Su,Fa	Sp,Su			3,4
00901	Wastina	M	6,366	0	300	0	40	0	0	11	351	0	419	0	Sp,Fa	DR			3,4
00902	Cinder Butte	M	10,776	320	600	0	40	0	0	34	674	0	891	0	Su,Fa,Wi	DR			3,4
00903	Beasley Lake	M	2,640	534	60	0	40	0	0	6	106	6	232	0	Sp,Su,Fa	Sp,Su			4
00904	Highway	M	2,420	989	80	0	40	0	0	11	131	0	118	0	Sp,Su,Fa,Wi	DR			4
00905	Homestead	M	12,877	9,728	500	0	40	20	8	568	0	685	0	Sp,Su,Fa,Wi	DR			3,4	
00906	North Webster	M	1,071	3,416	40	0	40	10	11	101	0	112	0	Su,Fa	DR			3,4	
00907	Devils Garden	M	4,406	0	100	0	600	80	16	826	0	0	0					3,4	
00908	Cougar Mountain	M	8,282	3,405	520	0	40	40	14	634	0	616	0	Sp,Su,Fa,Wi	DR			3,4	
00909	Button Springs	M	8,779	1,240	240	0	40	10	12	302	0	1,068	0	Sp,Su,Fa	DR			3,4	
00910	Hogback Butte	M	4,384	4,234	170	0	40	60	12	282	0	680	0	Sp,Su,Fa	DR		1992	3,4	
00911	Valley	M	6,120	769	120	0	30	0	17	167	0	613	0	Sp,Su,Fa	RR			4	
00914	West Green Mountain	M	21,656	4,240	200	0	40	60	13	313	0	1,395	0	Sp,Su,Fa	DR	1984		4	
00915	Squaw Butte	M	8,230	460	500	0	40	30	35	605	0	1000	0	Sp,Su,Fa	DR	1985		4	
01000	Little Juniper Spring	I	116,836	780	440	0	0	30	40	510	0	5,418	0	Sp,Su,Fa	RR			1,2,3,4	
01001	Alkali Winter	M	87,570	6,817	0	55	0	50	5	110	0	6,223	0	Fa,Wi	Wi		1990	3,4	
01002	Bar 75 FRF	C	2,588	0	0	2	0	10	2	14	0	73	0	Sp,Su,Fa,Wi	Sp,Su			4	
01072	South Butte Valley	M	3,710	0	0	2	0	0	2	4	0	900	0	Fa,Wi,Sp	Sp			4	
01300	Becraft	C	120	0	3	0	0	0	2	5	0	10	0	Fa	Unk			4	
01301	Crooked Creek	C	240	0	3	0	0	0	2	5	0	10	0	Sp,Su	Unk			4	
01302	Thomas Creek	C	40	0	10	0	0	0	4	14	0	30	0	Su,Fa	Unk			4	
01303	O'Keeffe	C	280	0	5	0	0	0	5	10	0	20	0	Sp,Su	Unk			4	
01305	Schultz	C	200	0	10	0	0	0	4	14	0	29	0	Sp,Su,Fa	Unk			4	
01306	Simms	M	363	0	20	0	0	0	7	27	0	55	0	Sp	Unk			4	
Totals			3,027,890	285,674	12,568	3,446	3,131	2,285	1,399	22,829	4,440/3,420	164,128	25,807						4

¹ Other wildlife = raptors, greater sage-grouse, small mammals/birds, etc. (includes an additional 276 AUM's allocated to other wildlife).

² Recommended forage allocation/present forage allocation. Adjustments from two allotments (#'s 400 and 426) outside the herd area which were incorrectly allocated forage for wild horses. Forage allocations are redistributed based on herd management area boundaries. Forage allocations are also increased to provide 12 months of forage for all horses at the top range of the appropriate management level (150 horses in the Paisley Herd Management Area, 250 horses in the Beaty Butte Herd Management Area).

³ SNU = Suspended nonuse.

⁴ Sp = Spring; Su = Summer; Fa = Fall; Wi = Winter.

⁵ Grazing systems: RR = Rest rotation; D = Deferred; DR = Deferred rotation; Sp = Spring; Su = Summer; Fa = Fall; Wi = Winter; FRF = Federal range fenced; Unk = unknown.

⁶ Management objectives: 1 = Improve and/or maintain riparian vegetation; 2 = Improve water quality and quantity; 3 = Maintain and/or improve wildlife habitat; 4 = Maintain and/or improve ecosite condition.

⁷ FRF = Federal range fenced: where small portions of Federal land are within fenced private lands; hence, grazing systems vary and are generally unknown.

Table 2-27.—Animal unit months (AUM's) authorized annually from 1991 to 2000¹

Year	Animal unit months
1991	83,751
1992	79,603
1993	96,234
1994	106,823
1995	112,372
1996	123,009
1997	127,251
1998	114,609
1999	118,946
2000	118,739
Average	108,134

¹ Grazing year March 1 to February 28.

standards and guidelines are intended to provide a clear statement of agency policy and direction for those who use public lands for livestock grazing and for those who are responsible for their management and accountable for their conditions.

The objectives of the rangeland health regulations are to “. . . promote healthy sustainable rangeland ecosystems; to accelerate restoration and improvement of public rangelands to properly functioning conditions . . . and to provide for the sustainability of the western livestock industry and communities that are dependent upon productive, healthy public rangelands.” The fundamentals of rangeland health combine the basic precepts of physical function and biological health with elements of law relating to water quality and plant and animal populations and communities. Although the focus of the standards is on domestic livestock grazing on BLM-administered lands, on-the-ground decisions must consider the effects and impacts of all uses.

The standards are the basis for assessing and monitoring rangeland conditions and trend. The assessments evaluate the standards and are conducted by an interdisciplinary team with participation from permittees and other interested parties. The five standards are as follows:

Standard 1, Watershed Function—Uplands: Upland soils exhibit infiltration and permeability rates, moisture storage, and stability that are appropriate to soil, climate, and landform.

Standard 2, Watershed Function—Riparian/Wet-

land Areas: Riparian/wetland areas are in properly functioning physical condition appropriate to soil, climate, and landform.

Standard 3, Ecological Processes: Healthy, productive, and diverse plant and animal populations and communities appropriate to soil, climate, and landform are supported by ecological processes of nutrient cycling, energy flow, and the hydrologic cycle.

Standard 4, Water Quality: Surface water and groundwater quality, influenced by agency actions, complies with State water quality standards.

Standard 5, Native, Threatened and Endangered, and Locally Important Species: Habitats support healthy, productive, and diverse populations and communities of native plants and animals (including special status species and species of local importance) appropriate to soil, climate, and landform.

The complete “Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands in Oregon and Washington” are found in Appendix E4.

Based on 43 CFR part 4180, if livestock are contributing to the nonattainment of a standard, as soon as is practical but no later than the start of the next grazing season, management must be implemented to ensure that progress is being made toward attainment of the standard(s).

The LRA commenced assessment of the standards and

Table 2-27a.—Range improvement program implementation as of 2001

Allotment #	Allotment name	Fences (miles)		Springs (#)		Pipelines (miles)		Wells (#)		Reservoirs (#)		Waterholes (#)		Guz- zlers (#)		Rehab— treat/seed (acres)		Prescribed burn (brush/juniper)— treat/no seed (acres)		Monitor/treat weeds (acres)	
		P ¹	C ²	P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C	M	C
00100	Peter Creek	12	7	0	0	1	12	1	0	0	0	1	0	0	0	0	0	0	0	0.25	0
00101	East Green Mountain	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
00102	Crack-in-the-Ground	2	4.5	0	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
00103	ZX-Christmas Lake	63	37.5	2	1	27	1	2	1	2	1	12	7	2	42,595	9,256	0	11,978	0.5	3.2	0
00104	Bottomless Lake	0	0	0	0	0	12	0	0	0	0	0	0	5	0	0	0	0	0.1	0	0
00200	Blue Creek Seeding	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00201	Vinyard Individual	0	6.6	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16.5	0
00202	Hickey Individual	0	3	0	0	0	0	0	0	1	3	0	0	0	200	1	0	0	0	5.5	0
00203	O'Keeffe FRF	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
00204	Crump Individual	1	5.8	1	0	1	0	0	3	0	0	0	0	0	300	0	0	0	0.1	0	0
00205	Greaser Drift	3	7.9	0	0	0	0	0	1	0	0	0	0	0	800	1,083	0	0	0	3.1	0
00206	Lane Plan II	0	0.8	0	0	0	0	0	0	1	4	0	1	0	760	0	0	0	0	17.6	0
00207	Lane Plan I	0	2.3	1	1	0	0	0	0	0	4	3	2	0	360	0	1,640	0	0.1	0	0
00208	Sagehen	0	4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00209	FRF Schadler	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00210 ³	Rim	0	0	0	0	0	0	0	0	0	0	0	0	0	160	0	0	0	0	0	0
00210	Rim	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
00214	Chukar Springs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00211	Round Mountain	0	2.6	1	0	0	0	0	0	1	3	1	3	0	1,240	0	0	10	0.25	0.6	0
00212	Rahilly-Gravelly	0	5.5	0	1	0	0	0	0	1	0	0	0	0	3,040	250	0	0	0	29	0
00213	Burro Springs	0	1	0	0	0	0	0	0	0	1	0	0	0	520	0	0	0	0	0	0
00215	Hill Camp	0	2.2	0	0	0	0	0	0	1	0	1	0	0	1,240	0	0	5,123	0	0.1	0
00216	O'Keeffe Individual	0	3.5	0	0	4	2	0	0	1	0	1	3	2	1,800	115	0	0	0.1	380	0
00217	Cox Individual	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
00218	Sandy Seeding	0	0	0	0	0	0	0	0	0	0	2	1	2	0	0	0	0	0	0	0
00219	FRF Cahill	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00222	Fisher Lake	0	4.3	0	0	0	0	0	0	0	0	0	0	0	360	2,020	0	0	0	0	0
00400	Paisley Common ³	85.3	0	0	0	23.5	0	5	0	4	0	34	0	0	35,005	0	0	0	0	0	0
00400	Coglan Hills	0	5	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.1	0
00418	Squaw Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.75	0
00419	St. Patricks	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Allotment #	Allotment name	Fences (miles)		Springs (#)		Pipelines (miles)		Wells (#)		Reservoirs (#)		Waterholes (#)		Guz- zlers (#)		Rehab— treat/seed (acres)		Prescribed burn (brush/jumper)— treat/no seed (acres)		Monitor/treat weeds (acres)	
		P ¹	C ²	P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C	M	C
00420	Egli Rim	0	15.6	0	0	0	1	0	1	0	3	0	0	0	0	0	230	0	0	0	60
00421	Rosebud	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00422	Paisley Flat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0
00423	Hill Field	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00424	West Lake (00417) ⁴	0	0	1	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
00425	Pike Ranch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00426	Five Mile Butte	0	18.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,800	0	280
00427	XL	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	2,300	0	0
00428	Sheeprock	0	8.7	0	0	0	1.3	0	0	2	0	18	2	0	0	0	0	0	3,010	0	14
00429	Twin Lakes	0	4.5	0	0	0	2	0	1	0	0	3	0	0	0	0	0	0	550	0	0
00430	South Poverty (00434) ⁴	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
00431	Narrows	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00432	Coleman Seeding	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	500	0.2	0
00433	East Jug Mountain	0	17.4	0	0	0	1	0	0	0	0	3	2	0	0	0	0	0	0	0	0
00435	Shale Rock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00436	Diablo Peak	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
004037	Abert Rim	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00403	Pine Creek	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	2,000	50
00404	Willow Creek	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	0	0
00406	West Clover Flat	0	0	0	0	0	0	0	0	3	0	0	0	0	0	100	0	0	0	0	8.9
00407	Clover Flat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00409	Tucker Hill	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	50	0	0
00410	Tim Long Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200	0	0	0	0	0
00411	Jones Canyon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00412	Fir Timber Butte (0413) ⁴	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	0	0	0	0
00415	Briggs Garden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00416	White Rock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00501	FRF Flynn	0	0.5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00502	FRF Fitzgerald	0	0	0	0	0	0	0	0	0	0	0	0	0	0	160	0	0	0	0	0
00503	FRF Taylor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	9.2
00505	FRF Lynch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00507	FRF Laird	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6
00508	FRF Rock Creek Ranch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Allotment #	Allotment name	Fences (miles)		Springs (#)		Pipelines (miles)		Wells (#)		Reservoirs (#)		Waterholes (#)		Guz- zlers (#)		Rehab— treat/seed (acres)		Prescribed burn (brush/juniper)— treat/no seed (acres)		Monitor/treat weeds (acres)	
		P ¹	C ²	P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C	M	C
00509	Cox Butte	15	1	0	0	0	0	0	0	1	0	5	0	0	0	1,240	0	0	0	0	0
00510	Orijana Rim	18	0	0	0	0	0	0	0	2	0	6	0	0	0	2,000	0	3,440	0	0	0
00511	Northeast Warner	13	4.5	1	0	3	0	1	0	4	6	5	3.1	4	0	9,040	2,240	0	0	0	0
00512	North Bluejoint	4	0	0	0	0	0	0	0	0	0	2	0	0	0	1,280	600	0	100	0.5	0.0
00514	Corn Lake	6	32.5	0	0	0	0	2	0	7	2	3	4	0	0	3,680	2,950	0	1,500	0	0
00515	Juniper Mountain	0	0	0	0	0	0	0	0	1	2	3	0	0	0	2,200	0	0	16	0.2	372.4
00516	<i>Rabbit Basin</i> ³	21	0	0	0	10	0	0	0	1	0	2	0	0	0	8,760	0	0	0	0	0
00516	Rabbit Basin	0	15.5	0	0	0	1	0	2	0	0	1	0	0	0	0	19,220	0	2,000	0	14
00529	South Rabbit Hills	0	13.5	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	25.9
00530	East Rabbit Hills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00531	North Rabbit Hills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00517	Coyote-Colvin	12	28.7	2	0	8	1	0	0	9	2	5	0	2	0	10,550	8,005	0	8,000	1	542.5
00518	Clover Creek	0	1	1	0	0	0	0	0	0	0	1	0	0	0	520	0	0	0	0	0
00519	Fish Creek	11	11.6	0	0	0	0	0	0	0	0	0	0	0	0	1,120	0	0	0	0.45	32.8
00520	Lynch-Flynn	4	5.2	0	1	0	0	0	1	2	0	0	0	0	0	600	100	0	800	0.1	4.8
00521	Friday Reservoir	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	5
00522	Abert Seeding	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	50
00523	Warner Lakes	12	15.9	0	0	0	0	0	0	0	0	0	2	0	0	2,880	0	0	0	1.2	1,001.1
00524	Lane Individual	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6
00529	South Rabbit Hills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25.9
00530	East Rabbit Hills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00531	North Rabbit Hills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00600	Beaty Butte	72.3	19.8	2	2	16	13	0	0	45	12	14	10	0	0	36,840	0	500	600	0.3	4.3
00700	Silver-Bridge Creek	0	2	0	0	0	1	0	0	0	0	0	0	0	0	200	0	0	0	0	0
00701	Upper Bridge Creek	0	2	0	1	0	0	0	0	0	0	0	0	0	0	282	0	0	0	0	0
00702	Buck Creek-Bridge Creek	0	5	0	0	0	0	0	0	0	0	0	0	0	0	225	1,000	0	495	0	0
00703	Bear Creek	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00704	Ward Lake	1	4.5	0	0	0	0	0	0	0	1	1	4	0	0	790	1	0	50	0	0
00705	Oatman Flat	0	8	0	0	1	0	0	0	0	0	0	1	1	0	757	0	0	0	0	0
00706	Rye Ranch	0	0	0	0	1	0.1	0	2	0	0	1	0	0	0	0	0	0	0	0	0
00707	Tuff Butte	1.5	0	0	0	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00708	Arrow Gap	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	0	0	0	0	0

Allotment #	Allotment name	Fences (miles)		Springs (#)		Pipelines (miles)		Wells (#)		Reservoirs (#)		Waterholes (#)		Guz- zlers (#)		Rehab— treat/seed (acres)		Prescribed burn (brush/juniper)— treat/no seed (acres)		Monitor/treat weeds (acres)	
		P ¹	C ²	P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C	M	C
00709	Dead Indian-Duncan	4	3.8	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3.25
00710	Murdock	6	4.8	0	0	1	0	0	0	1	0	0	0	0	0	550	0	0	0	0	5.5
00711	South Hayes Butte	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00712	Bridge Well	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00713	Silver Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00714	Table Rock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5
00716	Silver Lake Lakebed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00900	Fremont	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00901	Wastina	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
00902	Cinder Butte	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
00903	Beasley Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	350	0	420	0	0
00904	Highway	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	640	0	0	0	0
00905	Homestead	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00906	North Webster	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00907	Devils Garden	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00908	Cougar Mountain	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00909	Button Springs	2	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1,700	0	0
00910	Hogback Butte	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00911	Valley	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
00914	West Green Mountain	0	0	0	0	1	0	0	0	0	0	0	0	0	0	335	0	0	0	0	0
00915	Squaw Butte	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
01000	Little Juniper Spring	11	6.82	0	1	0	0	0	0	0	5	0	0	0	0	0	0	300	0	0	0
01001	<i>Alkali Winter</i> ³	6	0	1	5	0	0	0	0	14	0	0	0	0	0	1,000	0	6,080	0	0	0
01001	Alkali Winter	0	20.5	0	0	0	0	0	0	0	5	0	0	0	0	1,720	0	0	0	0	0
01002	FRF Bar 75 Ranch	0	0	0	0	0	0	1	0	2	0	0	0	1	0	0	17,600	0	6,100	0	1
01073	South Butte Valley	0	4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Totals		389.1	326.10	15	15	106	55.40	12	27	92	55	105	75.1	28	175,119	66,035	11,960	65,294	5.75	2,928.80	

¹ P = Proposed in management framework plans, "Lakeview District Grazing Management Range Program Summary and Record of Decision" (1982), "Warner Wetlands Plan Amendment and ACEC Management Plans" (1990), and "High Desert Management Framework Plan Amendment and Record of Decision for the Lake Abert Area of Critical Environmental Concern (ACEC) in Lake County, Oregon" (1996); does not include projects completed prior to 1983.

² C = Completed to date, based on data contained in "Rangeland Improvement Program Summary" database between 1983 and 1997.

³ Allotment names in italics were historic "parent" allotments which have been subsequently divided into the subset of allotments which follow.

⁴ Allotment numbers in parentheses were merged with the listed allotment.

Table 2-28.—Areas unallotted or excluded from livestock grazing

Area	Acres
Unallotted Areas	
Miscellaneous unallotted areas ¹	19,336
Diablo WSA ²	53,648
Bottomless Lake	583
Devils Garden WSA	4,000
Warner Wetlands ACEC	22,674
Summer Lake	18,385
Lake Abert ACEC	37,108
<i>Subtotal</i>	155,734
Excluded Areas	
Beaty Butte BLM/USFWS Highway 140 Enclosure ²	4,502
Buck Creek Watchable Wildlife Area	590
Fossil Lake ACEC	5,725
Table Rock Proposed ACEC	4,086
Warner Wetlands ACEC	31,355
Cahill	165
Guano Creek WSA/Cooperative Management Area/Proposed ACEC/RNA	11,796
Chuckar Spring	30
West ½ of Abert Rim WSA/Proposed ACEC	9,766
Tucker Hill Proposed ACEC ²	3,896
Alkali Lake	570
Coyote-Colvin	63
Devils Garden WSA	39
Fish Creek	265
Fisher Lake	47
Fitzgerald	93
Greaser Drift	4,335
Hickey Individual	46
Highway 31 ROW	98
Hill Camp	153
Lane Plan I and II	700
O'Keeffe	84
Rahilly-Gravelly Proposed ACEC/RNA	287
Round Mountain	2,269
FRF Taylor	938
Vinyard Individual	1,483
Miscellaneous livestock exclusion areas ³	5,316
<i>Subtotal</i>	88,697
<i>Total ungrazed area</i>	244,431

¹ Includes small, isolated parcels in the area of Christmas Valley and Lakeview.² Where grazing is currently not allowed due to grazing agreements, a grazing decision is needed to officially exclude these areas from grazing.³ Areas include small, unnamed stream, spring, reservoir, riparian, and other enclosures.

Table 2-28a.—Summary of standards for rangeland health assessments, 1998–2001

Allotment number	Allotment name	Public acres	Rangeland Health Standards				
			1	2	3	4	5
00103	ZX Christmas Lake	524,180	Not met ¹	N/A	Not met ²	Met	Met
00201	Vinyard	8,600	Met	Met	Met	Met	Met
00202	Hickey Individual	10,906	Met	Met	Met	Met	Met
00203	O'Keeffe	565	Met	Met	Met	Met	Met
00206	Lane Plan II	9,910	Met	Met	Met	Met	Met
00207	Lane Plan I	24,725	Met	Met	Met	Met	Met
00208	Sagehen	3,820	Met	Met	Met	Met	Met
00211	Round Mountain	16,330	Met	Not met ³	Met	Met	Met
00212	Rahilly-Gravelly	33,285	Met	Met	Met	Met	Met
00216	O'Keeffe Individual	51,785	Met	N/A	Met	Met	Met
00428	Sheeprock	144,025	Not met ¹	N/A	Met	N/A	Met
00517	Coyote-Colvin	123,038	Met	Not met ³	Met	Met	Met
00519	Fish Creek	11,805	Met	Met	Met	Met	Met
00600	Beaty Butte	506,985	Met	Not met ⁴	Met	N/A	Met

¹ Standard not met in native pastures on 23,616 acres; grazing system modified to provide 2 years' rest after grazing; in nonnative seedings, rest is provided 1 year in a 3-year rotation.

² Standard not met on 41,600 acres; modifying the grazing system in the native pastures and nonnative seedings would provide for improvement.

³ Changes in riparian grazing have resulted in significant progress toward attainment of this standard.

⁴ Standard not being met; however, a jurisdictional transfer with the USFWS has removed this area from livestock grazing.

guidelines in 1998 and will continue this process for the next 8 years. Approximately 10 percent of the public land acres in the resource area would be assessed each year. The process has been completed on 14 allotments encompassing 1,469,859 acres through the end of the 2000 fiscal year (see Table 2-28a). Ten term grazing permits, which have been through the assessment process, were issued through the end of fiscal year 2001. In the assessments completed, livestock were not identified as contributing to the nonattainment of any standard, except in one situation (Beaty Butte Allotment [0600]). This was mitigated through an administrative jurisdictional transfer of a portion of the Jack Lake riparian pasture to the USFWS. Management was changed to reflect their existing land use plan (i.e., no grazing) (USDI-BLM and USDI-USFWS 1998a, 1998b; USDI-USFWS 1994a, 1994b). If a term grazing permit expires and an assessment cannot be completed due to conflicting workloads, a standard stipulation is placed in the terms and conditions of the permit, identifying that an assessment will be completed in the future and this assessment may result in a modification of the permit if it is determined that livestock grazing is contributing to the nonattainment of a standard.

Rangeland Projects

Various rangeland treatments, such as brush control and rangeland seeding, have been completed in the LRA. Structural improvements, such as fences, cattleguards, reservoirs, spring developments, wells, and pipelines, have been constructed to facilitate livestock distribution and rangeland management (see Table 2-27a). Nonnative seeding has occurred since the 1950s. The original objective of rangeland seeding with nonnative species was to increase livestock forage, reduce erosion and soil loss, and decrease potential invasion of annuals. The high cost of native seed, its availability, and difficulty of cultivation were contributing factors for use of nonnative seed. The development of various grazing systems resulted in seedings being used to rest or defer use of adjacent native vegetative communities. For the most part, seeding since the 1970s has been developed as a result of emergency fire stabilization and rehabilitation on sites that were susceptible to erosion and the invasion of noxious weeds and nonnative annual grass species (such as cheatgrass). As summarized in the vegetation section, nonnative seedings encompass approximately 249,140 acres or 7.8 percent of the resource area (Table 2-27a).

As mandated in FLPMA and PRIA, a portion of the grazing fees is invested in range improvements with the expectation that these improvements may benefit wildlife, watersheds, and livestock producers. Livestock operators, state and Federal agencies, and other interested public entities have continued to fund rangeland improvement construction.

Through use of emergency fire rehabilitation funds, additional public land resources have been protected through rehabilitation of burned areas, thereby reducing soil loss and decreasing the ability of noxious weeds and annual nonnative grasses to become established.

Allotment Categorization/Grazing Systems

Every allotment in Table 2-26 is assigned a grazing system code to indicate the type of grazing system in effect. The grazing systems referred to in Table 2-26 are described in Appendix E5. The rest rotation system is the most common, but in larger allotments there may be a combination of systems used, as the rest rotation is not the best system for all vegetation types or pastures. The system shown in Table 2-26 is the system that controls the largest acreage within an allotment.

Grazing systems were limited before the 1960s. In the mid-1960s, grazing systems were established to maintain or establish plant communities. Grazing systems have evolved to protect and maintain plant community diversity and the resource values on public land.

Three selective management categories are used to administer livestock grazing. All allotments were grouped into these categories according to management needs, resource conflicts, potential for improvement, and Bureau funding/manpower constraints.

Improve (I) category allotments: Are managed to resolve a high level of resource conflicts and concerns and receive the highest priority for funding and management actions.

Maintain (M) category allotments: Are managed to maintain current satisfactory resource conditions and will be actively managed to ensure that resource values do not decline.

Custodial (C) category allotments: Are managed custodially by the BLM to protect resource conditions and values.

There are 27 I Category allotments, 64 M Category allotments, and 29 C Category allotments in the LRA.

The “Lakeview Grazing Management Final Environmental Impact Statement” (USDI-BLM 1982a, 1982b), subsequent rangeland program summaries, and Lakeview District planning updates have all outlined proposed grazing systems for all I and M allotments. As a result of land-use planning direction, grazing systems have been developed and implemented through agreements with permittees. These grazing systems are usually documented and described in an allotment management plan. An allotment management plan is a documented program, developed as an activity plan, that directs management of livestock grazing on specified public land in order to achieve objectives relating to desired resource conditions, sustained yield, multiple use, and economics (ranch). Allotment management plans are implemented when incorporated into term grazing permits or leases and accepted by the permittees or lessee. Strategic portions of allotment management plans are the rangeland projects designed to meet resource objectives and subsequent grazing systems/schedules. LRA has implemented allotment management plans on 9 I Category allotments and 16 M Category allotments. Grazing management has been developed for the remainder of the allotments by agreement or annual authorization. Appendix E1 displays allotment specific information.

Monitoring data collection tracks progress in meeting identified management objectives. Active grazing use authorizations and management actions in each allotment are periodically evaluated, based on the monitoring data. Adjustments are made by agreement or decision in accordance with legislation, regulations, and policy so that public land resources are maintained or improved. As allotment or rangeland assessments are completed, allotments could be placed in different categories.

Range Condition

ICBEMP assessed the rangeland integrity of all the subbasins in the project area. “Measures of rangeland integrity include such elements as: (1) grazing influences on vegetation patterns and composition, (2) disruptions to the hydrologic regimes, (3) expansion of exotic species, (4) changes in fire severity and frequency, (5) increases in bare soil, and (6) expansion of woodlands into herblands and shrublands.” In the planning area, Summer Lake and Lake Abert Subbasins were rated as having low range integrity and the Warner Lakes and Guano Subbasins were rated as having moderate range integrity (USDI-BLM and USDA-USFS 1996h). Appendix A2 contains a summary of the ICBEMP findings applicable to the planning area.

Ecological site inventory data describes the condition of vegetative communities based on soil characteristics and potential natural vegetative community. Currently, ecological site inventory data is not available for the entire resource area. A description of the ecological site inventory process is contained in Appendix C2.

Wild Horses

Introduction

It is commonly believed that Spanish explorers reintroduced the horse to North America in the early 1500s. After that time, descendants of these horses became widespread across the West. Between 1880 and the 1930s, the number of wild horses in eastern Oregon increased rapidly as horses brought to this area by settlers, ranchers, and the U.S. Cavalry escaped or were abandoned by their owners and joined wild horse herds. By the late 1940s, wild horse numbers were estimated at 2,500 to 3,000 in the LRA.

Local residents remember the 1950s as a period of intensified gathering throughout eastern Oregon, and as a result, horse populations were drastically reduced. By the late 1950s, fewer than 50 horses remained in the Beaty Butte area. No estimates were recorded for the Paisley area.

Public concern and outcry in the late 1960s influenced Congress to pass the "Wild Free-Roaming Horse and Burro Act" in 1971 (Public Law 92-195). The law provides for the protection, management, and control of wild horses and burros on public land. The Act defines "wild free-roaming horses and burros" as all unbranded and unclaimed horses and burros on public lands. Two herd areas have been managed in the LRA since 1971.

Federal protection and the absence of natural predators have resulted in an increase in the wild horse and burro populations. In 1973, the BLM began the Adopt-A-Horse or Burro Program. Under this program, excess wild horses and burros are removed from the range as a

way to maintain healthy herds and protect the habitat. The animals are then offered for adoption to qualified adopters.

Herd Management Areas

Wild horses in the LRA are managed in two designated areas: Paisley Desert Herd Management Area and the Beaty Butte Herd Management Area (Map SMA-1 of the Draft RMP/EIS). The northern portion of the Paisley Desert Herd Management Area is unavailable to wild horses. No wild horses have been seen in this area from 1973 to present. As a result of the Paisley adjudication agreements of 1986 and 1992, the 31,859 acre area was developed for livestock grazing, including seedings and division of the area into several pastures. The present fencing prevents horses from drifting into the area. The goal of the wild horse program is to keep horses within the herd management areas and to manage horse numbers at viable levels while maintaining the natural habitat in an ecological balance. Further information may be found in the Paisley Desert and Beaty Butte wild horse management plans (USDI-BLM 1977a, 1977b).

Horses compete with livestock and wildlife for forage. In order to prevent resource damage, BLM has established a limit for the amount of forage that may be taken from a given area. The vegetative resource is managed by dividing the available forage among competing uses in a forage allocation. Forage allocations for horses in each herd management area are based on the maximum number of horses in the appropriate management level range. Herd sizes have been established based on available resources, reproductive rates, other range uses, and public input. Table 2-29 shows statistics for the two herd management areas.

Appropriate management levels, as well as the boundaries of each herd management area, were established through previous land use plans (USDI-BLM 1983a, 1983b). Appropriate management levels are established to ensure that public land resources, including wild horse habitat, are maintained in satisfactory, healthy condition, and that unacceptable impacts to

Table 2-29.—Herd management areas and herd areas in the Lakeview Resource Area

Herd management areas	Public acres	Appropriate management level range	Forage allocation (AUM's) ¹
Paisley Desert ²	303,526	60–110	1,020
Beaty Butte	438,773	100–250	2,400

¹ Animal unit months, based on a the original appropriate management level for each herd management area; 85 horses in the Paisley Herd Management Area and 200 horses in the Beaty Butte Herd Management Area.

² The 31,859 acres of the Paisley Desert Herd Management Area is unoccupied by and unavailable to wild horses.

these resources are minimized. To date, the data gathered during herd area monitoring supports established appropriate management levels.

Herd areas are monitored each year through aerial and/or ground census. Data on the use of forage plants is collected annually. Determinations to gather the herds, the number of horses to be removed, and when they are to be removed are based on these surveys. Table 2-30 shows census numbers for each herd management area since 1971.

Herd Gathers

Horses are usually allowed to run free until a herd reaches its maximum size or monitoring data indicates a need to gather. Horses are also gathered if they stray outside the boundaries of the herd management area. The excess horses are gathered to prevent resource overuse and to keep the herd healthy. Generally, gathering is scheduled every 3 to 5 years, depending on reproductive rates, death rates, funding, public concern, and other special management considerations. Site-specific gathering details, including trap sites, are determined at the time of each gather. Temporary traps are placed adjacent to existing roads and remain in place for up to 14 days. Occasionally, temporary traps may be placed within WSA's if no other reasonable location is within 10 miles of wild horses. Traps placed in WSA's are accessed on existing roads or ways.

The Paisley Desert and Beaty Butte herds have been gathered numerous times since 1971 (Table 2-31). Horses have historically strayed outside the herd management areas. Horses from the Beaty Butte herd move between the Burns District to the east and the Lakeview District, and between the Sheldon and Hart Mountain National Wildlife Refuges. Horses from the Paisley Desert often move east and south into surrounding crested wheatgrass seedings.

Gathering is done outside the normal February through June breeding and foaling season. Usually, horses are gathered to reduce numbers to the lower end of the appropriate management level range to avoid the need for frequent, expensive gathers that may disrupt the herd. Excess horses are usually transported to the Burns Wild Horse Corral for adoption by the public, but horses may go to other adoption sites throughout the United States. Table 2-31 shows the number of horses removed from each herd management area by gathers since 1977.

Fertility Control

Fertility control research using immunocontraceptives in mares may be conducted in either herd management area. A study of fertility control on the Beaty Butte herd was done in the late 1980s by the University of Minnesota. Dominate studs in the herd management area were gelded and released back to the herd management area. In another fertility research effort, 20 horses (13 mares and 7 studs) were released back into the Beaty Butte herd in 2002. The mares were inoculated with an immunocontraceptive vaccine called PZP in an attempt to slow down reproductive rates. This contraceptive is expected to remain effective for 1 to 2 years, and the effects on population levels will be monitored (USDI-BLM 2000d).

Herd Quality and Genetics

Herds in both the Paisley Desert and Beaty Butte Herd Management Areas are in good condition; they exhibit few health problems.

Wild horses in these herds are managed first for quality and conformation and second for color. They come in all shapes and sizes. Adult horses average from 14 to 16 hands and weigh 950 to 1,300 pounds.

There is a wide variety of genetic backgrounds among the horses in both herds. The colors of the original Paisley Desert horses were predominately solid colors of bay, brown, and sorrel. Presently, nearly every color can be found among the horses in the herd. In the southeast portion of the herd area, a few bands consist of horses in varying colors of gray. Others are buckskin, palomino, or dun. Pintos were introduced into the area in 1980.

Historically, bloodlines appear to have been mainly thoroughbred with a few heavily-muscled horses, possibly of draft breeding. However, horses from outside the herd area have been introduced, and crossbreeding has occurred to the point that bloodlines are no longer pure.

The majority of the Beaty Butte horses are blacks, sorrels, browns, and roans. From appearance, bloodlines in the herd include draft horses, saddle-type riding horses, and thoroughbreds. Several bands of horses exhibit characteristics of the Spanish mustang, including small size, hooked ears, dun color, tiger-striped legs, and dorsal stripe (Table 2-32 shows characteristics of each herd).

Table 2-30.—Paisley Desert and Beaty Butte Herd Management Area census summaries

Paisley Desert Herd Management Area ¹			Beaty Butte Herd Management Area ²		
Year	Total horses	Number of foals	Year	Total horses	Number of foals
1971	81	10	1971	190	44
1972	121	32	1972	271	69
1973	177	28	1973	365	25
1974	219	49	1974	482	110
1975	288	68	1975	611	117
1976	307	70	1976	762	176
1977 ³	368		1977	879	189
1978	137	19	1978 ³	273	44
1979	179	30	1979	305	54
1980	215	37	1980	419	91
1981 ³	244	47	1981 ³	441	85
1982	70	17	1982	249	49
1983	119	29	1983	291	52
1984	147	28	1984 ³	382	56
1985	176	45	1985	167	33
1986 ³	286		1986	233	37
1987 ⁵	56		1987	250	35
1988	40 ⁶	9	1988 ³	260	42
1989	70	13	1989	150	29
1990	99	11	1990	154	25
1991	139	24	1991	250	59
1992 ³	203		1992 ³	312	62
1993	77		1993	77	18
1994	143	24	1994	118	20
1995 ³	172 ¹		1995	142 ¹	
1996	103		1996	191	
1997	144		1997	283	35
1998	142 ⁴		1998	393	75
1999	172		1999 ³	474	
<u>2000</u>	<u>369</u>		<u>2000</u>	<u>193</u>	
<u>2001</u>	<u>60</u>		<u>2001</u>	<u>436</u>	

¹ Summary is for horses inside the herd management area; horse numbers are estimated based on an average of 20 percent increase per year.

² Most years, horses were inventoried by flying over the herd area; however, during some years, horse numbers are estimated based on an average 20 percent increase per year. Variability in inventory numbers is from horses moving in and out of the herd area into and out of Sheldon and Hart Mountain Wildlife Refuges and into and out of the Burns District.

³ Year horses were gathered.

⁴ Partial inventory.

⁵ Year horses were introduced.

⁶ Mortality: 12 horses strayed outside the herd management area and died from dehydration in an area with no natural water sources.

Table 2-31.—Paisley Desert and Beaty Butte Herd Management Area gathers

Year	Number of horses	Number of horses removed
Paisley Desert Herd Management Area		
1977	368	235
1981	244	183
1986	286	238
1992	203	105
1995	172	82
2000	411	351
Beaty Butte Herd Management Area		
1977–78	879	776
1981	419	272
1984	382	260
1988	260	186
1992	250	162
1999	472	283
<u>2001</u>	<u>427</u>	<u>327</u>

Table 2-32.—Characteristics representative to each wild horse herd

Herd	Color/type	Markings	Size	Weight
Paisley Desert	Any color, especially pinto, buckskin, dun, grulla, and grey/saddle type	N/A	14–16 hands	950–1,300 lbs
Beaty Butte	Any color, especially red or blue roan, and grey/saddle type; dun, grulla, buckskin, claybank, and variations/Spanish mustang type	Dorsal stripes	13–16 hands	750–1,300 lbs

Special Management Areas

Areas of Critical Environmental Concern

Introduction

As a part of the preplanning process for the RMP, the LRA staff considered and evaluated all lands within the resource area for possible designation as ACEC's and RNA's. FLPMA and BLM policy require the BLM to give priority to designation and protection of ACEC's during the land use planning process (USDI-BLM 1988).

ACEC's are areas within BLM-administered lands where special management is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or natural systems or processes, or to protect life and safety from natural hazards. Appendix I contains a complete description of the ACEC criteria and the designation process.

The Sand Dunes/Lost Forest/Fossil Lake ACEC/RNA and Devils Garden Lava Beds ACEC were designated in previous land use plans (USDI-BLM 1982a, 1982b, 1983a, 1983b). The Connley Hills area was found to met the relevance and importance criteria for a potential ACEC, as well as the criteria for designation as a Federal RNA. An interdisciplinary team recommended that the "... proposed Connley Hills RNA be managed as an interim RNA until such time as the management framework plan for the District is amended or updated." (USDI-BLM 1985). Other areas were considered for potential ACEC designation in the "Lakeview Grazing Management Final Environmental Impact Statement," but failed to meet the criteria (BLM 1982a). As a whole, the LRA was not evaluated for potential ACEC designation at the time management framework plans were completed in the early 1980s. Two plan amendments have since been completed which designated the Warner Wetland and Lake Abert ACEC's (USDI-BLM 1989b, 1989c, 1996c, 1996d). Existing ACEC's are shown on Map SMA-1 of the Draft RMP/EIS.

Background

ACEC's may be nominated by members of the public, other agencies, and BLM staff at any time. In 1992, the BLM contracted with the ONHP to conduct a survey to evaluate plant and animal community "natural heritage cells" within the resource area and to reevaluate previous ACEC nominations. After reviewing the entire LRA, nine sites were recommended for designation for both ACEC and RNA status, because they contained at least one ONHP plant community cell (Vander Schaff 1992). Those recommendations, along with other nominations from the Oregon Natural Resources Council, various Native American Tribes, BLM staff, and Dr. Richard Miller (Oregon State University), were evaluated by the LRA staff. These findings are documented in the "Areas of Critical Environmental Concern Nomination Analysis Report" (USDI-BLM 2000a). Copies of the complete report are available from the LRA office or at the office's web site at www.blm.or.gov/Lakeview/planning.

BLM policy requires that RNA's be managed as ACEC's; therefore, areas nominated as RNA's must meet the ACEC criteria. Nine new RNA's have been proposed in addition to the existing Lost Forest RNA. RNA management goals and plans are usually more restrictive than ACEC management alone, as RNA's are created for scientific research and should maintain values for the representative cells and values.

Existing Areas of Critical Environmental Concern

At present there are four existing ACEC's in the LRA (Table 2-32b).

The Lost Forest/Sand Dunes/Fossil Lake ACEC currently does not have a detailed management plan, but is managed under the wilderness interim management policy (IMP) (USDI-BLM 1995b). Devils Garden has an interim management plan and is also managed under the wilderness IMP. Lake Abert ACEC

has a detailed management plan (USDI-BLM 1996d). A portion of the area is also covered by the wilderness IMP. This ACEC is proposed for expansion to include land on top of Abert Rim. Warner Wetlands is covered by a number of activity management plans (USDI-BLM 1990b, 1990c, 1990d, 1990e, 1990f, 1990g, 1990h, 1990i, 1990j). The existing ACEC's are shown on Map SMA-1 of the Draft RMP/EIS and are described in Appendix I.

Potential Areas of Critical Environmental Concern

Table 2-33 lists areas evaluated for ACEC or RNA designation as part of the planning process. The table shows the name of the proposed ACEC and the values for which it is nominated. Maps SMA-2 and -3 of the Draft RMP/EIS, and SMA-4 show the location of the nominated areas. Table I-1 (in Appendix I) shows another 11 areas which were considered, but did not meet the relevance and importance criteria. The evaluation documents that the potential ACEC's listed in Table 2-33 meet the relevance and importance criteria and require special management.

Wilderness Study Areas

Under section 603 of FLPMA, the BLM was required to complete a wilderness review of public land in Oregon. Based on an inventory and study of the public lands within the LRA in the 1980s, 12 WSA's were recommended in 1989 for possible designation as wilderness by Congress (USDI-BLM 1989a, 1991a). Until Congress acts on the wilderness recommendations or otherwise releases WSA's for other purposes, WSA's are managed in accordance with BLM's "Interim Management Policy for Lands Under Wilderness Review" (wilderness IMP) (USDI-BLM 1995b). As mandated by section 603(c) of FLPMA, these WSA's will be managed in a manner which will not impair their suitability for preservation as wilderness.

Each of the WSA's within the LRA have the minimum

Table 2-32b.—Existing areas of critical environmental concern

Area of critical environmental concern	Acres ¹	Values
Devils Garden Lava Beds	28,241	Lava tubes, cinder and spatter cones, botanical
Lake Abert	50,165	Aquatic ecology, cultural, visual, wildlife
Lost Forest (RNA)/Sand Dunes/Fossil Lake	35,120	Relict ponderosa pine, dunes, prehistoric
Warner Wetlands	52,033	Wildlife habitat, wetlands, prehistoric, scenic
Total	165,559	

¹ The acreage is based on boundary lines captured within geographic information system data sets. Acre estimates may be different than previously published estimates.

Table 2-33.—Areas proposed for area of critical environmental concern designation

Name of proposed ACEC	Resource values (relevance/importance) ¹
Connley Hills RNA	<i>Botanical, cultural, and ecological values:</i> Essential habitat of species diversity. Unique plant communities limited to this site in Oregon. Fills ONHP cells for Basin and Range Ecosystem: (4) western juniper, big sagebrush, bluebunch wheatgrass, (7) western juniper, bluebunch wheatgrass, (8) western juniper, Idaho fescue community, (11) big sagebrush, bluebunch wheatgrass community. Outstanding archaeological values.
Guano Creek/Sink Lakes RNA	<i>Botanical and ecological values:</i> <u>Low elevation vernal pool and sagebrush/sandberg bluegrass scabland. Fills ONHP cells for Basin and Range Ecosystems: (28) low sagebrush, Sandberg's bluegrass scabland (terrestrial system), (53) low elevation vernal pond (aquatic ecosystem), (15) big sagebrush, needle-and-thread community, (64) silver sagebrush/Great Basin wildrye, (82) low elevation riparian community. Two Bureau sensitive plants in area. Cultural plants present.</u>
Hawksie-Walksie RNA (formerly Hawk Mountain I and II)	<i>Botanical, cultural, and ecological values:</i> Outstanding example of biodiversity of high desert grassland steppe. Fills ONHP cell for Basin and Range Ecosystems: (11) big sagebrush, bluebunch wheatgrass, (12) big sagebrush, Idaho fescue communities. Cultural and archaeological significance. Evidence of long-term relationship of Tribal people and landscape.
High Lakes	<i>Cultural, wildlife, and botanical values:</i> High concentration of rock art sites up to 7,000 years old. Diversity of plants and animals, especially cultural plants. Bureau sensitive plant found in area. Evidence of long-term relationship of Tribal people and landscape. May be eligible for traditional cultural property designation. Critical greater sage-grouse habitat.
Fish Creek Rim RNA	<i>Cultural, wildlife, and botanical values:</i> High density of significant sites in upland environment. Significant plant species diversity; fills ONHP cells in Basin and Range Ecosystems: (20) big sagebrush-bitterbrush, Idaho fescue, (26) low sagebrush, Idaho fescue scabland, (37) mountain mahogany, mountain big sagebrush, and where possible, bitterbrush, (41) snowbrush and bittercherry shrub complex. Two Bureau sensitive plants.
Spanish Lake RNA	<i>Botanical and wildlife values:</i> Diversity of salt desert scrub communities with limited distribution in LRA and Northern Great Basin. Meets ONHP cell for Basin and Range Ecosystems: (19) black greasewood-shadscale/bunchgrass playa margin vegetation, (73) playa with greasewood and Great Basin wildrye (aquatic ecosystem), (34) <u>shadscale-budsage/bunchgrass salt desert shrub.</u>
Rahilly-Gravelly RNA	<i>Cultural, wildlife, and botanical values:</i> High density and variety of significant cultural sites. Plant gathering area for Northern Paiute. May qualify as a traditional cultural property. Presence of Bureau sensitive plant species. Meets ONHP cell needs for Basin and Range Ecosystems: (6) western juniper, big sagebrush-bitterbrush community, (21) <u>mountain brush (mountain big sagebrush-bitterbrush-squawapple, (40) bitterbrush-sagebrush, mountain snowberry/Thurber needlegrass mosaic.</u> Critical greater sage-grouse habitat.
Foley Lake RNA	<i>Cultural and botanical values:</i> Significant cultural sites related to resource procurement, settlement patterns, and religious practices. Important species diversity and presence of Bureau sensitive plant species. Meets ONHP cells for Basin and Range Ecosystems: (30) black sagebrush, bunchgrass community complex.
Table Rock	<i>Cultural, botanical, and scenic values:</i> High density of unique site types. Presence of two Bureau sensitive plant species; also old growth western juniper. May qualify as a traditional cultural property. Visual and recreation values.
Black Hills RNA	<i>Botanical values:</i> Ecologically diverse western juniper community, age classes, with disjunct pine community. Two Bureau sensitive plants. Meets ONHP cell for Basin and Range Ecosystems: <u>proposed ash soil plant community.</u>

Name of proposed ACEC	Resource values (relevance/importance) ¹
Red Knoll (formerly Tucker Hill)	<i>Cultural, wildlife, and geological values:</i> High density and wide variety of sites important for research and traditional cultural values. Presence of ancient beach erosion terraces. Unique plant community containing a Bureau sensitive plant species. Critical greater sage-grouse habitat.
Abert Rim	<i>Cultural, wildlife, and botanical values:</i> Cultural and biodiverse plant communities; high in cultural plants.
Juniper Mountain RNA	<i>Botanical and ecological values:</i> Old growth western juniper and high species diversity. Meets ONHP cell description: (5) western juniper, big sagebrush, Idaho fescue.

¹ See Appendix I for detailed descriptions of ACEC values including plants and cell descriptions.

characteristics necessary to qualify for wilderness consideration. These characteristics include: (1) 5,000 acres (or more) of contiguous BLM land, (2) roadless islands of any size or roadless areas of sufficient size to make practical their preservation and use in an unimpaired condition, and (3) possess outstanding opportunities for solitude or for primitive and unconfined types of recreation. Many of the WSA's contain special features, such as unique or sensitive plant and animal species and communities, interesting geologic features, cultural or paleontological resources, or other features of scientific, educational, scenic, or historic value.

A brief description of the location, number of acres recommended and not recommended for wilderness designation, and a summary of the criteria considered in developing the suitability recommendations for each WSA is contained in Appendix J2 of the Draft RMP/EIS. Table 2-34 lists each of the WSA's and the number of acres recommended or not recommended for wilderness designation. The WSA's are shown on Map R-1 of the Draft RMP/EIS. The Basque Hills and Rincon WSA's straddle the Lakeview/Burns District boundary, and are managed by the Burns District. Complete descriptions of these WSA's can be found in the "Oregon Wilderness Environmental Impact Statement" (USDI-BLM 1989a). Acreages listed in Table 2-34 are only those located within the LRA. These acreages are based on the most up-to-date geographic information system measurements and, therefore, may differ from those listed in the "Oregon Wilderness Environmental Impact Statement."

Since 1992, when the wilderness recommendations were submitted to Congress, 3,139 acres of land adjacent to or within three WSA's (Fish Creek Rim, Abert Rim, and Guano Creek) have been acquired through land exchanges and donations. The wilderness characteristics of these lands have been evaluated in Appendix J4 of the Draft RMP/EIS.

Wild and Scenic Rivers

Introduction

BLM is an active participant in managing designated wild, scenic, and recreation rivers, and in contributing to the eligibility, classification, and suitability studies of rivers listed in the "Nationwide Rivers Inventory" and other potential rivers. Other potential rivers are those identified by congressional bills, BLM, or the public, which might meet the qualifications for wild, scenic, or recreation river designation but have not been formally considered.

To be eligible for inclusion in the national WSR system, a river must be free-flowing and have at least one outstandingly remarkable river-related value within its immediate environment (usually a 0.25-mile corridor along each side of the river).

Existing Conditions

Currently, there are no rivers within the LRA that are designated or listed in the "Nationwide Rivers Inventory." In 1982, the Chewaucan River was evaluated by the Fremont National Forest to determine if the river was eligible for inclusion into the national WSR system (USDA-FS and USDI-BLM undated). This evaluation was coordinated with BLM's Lakeview District, since 4 miles of the river runs through BLM-administered lands. The report found that the Chewaucan River did not meet the minimum eligibility criteria of having outstandingly remarkable values. Furthermore, it stated that the mixed land ownership within the river corridor would create problems in formulating a coherent management plan for the entire river corridor.

Another joint eligibility assessment between the BLM and Fremont National Forest came about from a 1989 appeal of the "Fremont National Forest Resource Management Plan." In an effort to resolve the appeal, the USFS agreed to assess the eligibility of five rivers:

Table 2-34.—Wilderness study areas and instant study areas

Name of area (WSA number)	Total acres within WSA ¹	Acres recommended for wilderness designation	Acres not recommended for wilderness designation ²
Devils Garden Lava Bed (OR-1-2)	28,241	28,160	1,520
Squaw Ridge Lava Bed (OR-1-3)	28,684	21,010	7,330
Four Craters Lava Bed (OR-1-22)	12,472	9,100	3,500
Sand Dunes (OR-1-24)	16,495	0	16,440
Lost Forest ISA	9,047	0	8,000
Diablo Mountain (OR-1-58)	118,799	90,050	23,070
Orejana Canyon (OR-1-78)	24,210	14,800	9,800
Abert Rim (OR-1-101)	25,129	23,280	0
Fish Creek Rim (OR-1-117)	19,146	11,920	4,770
Guano Creek (OR-1-132)	10,591	10,350	0
Spaulding (OR-1-139)	68,589	0	69,530
Hawk Mountain (OR-1-146A)	45,604 ³	<u>45,604</u> ³	0 ³
Sage Hen Hills (OR-1-146B)	7,988 ³	0	8,520
Basque Hills (OR-2-84) ⁴	68,368 ³	0 ³	68,368 ³
Rincon (OR-2-82) ⁴	3,510 ³	0 ³	3,510 ³
Total	486,873	254,274	224,358

¹ Acreage based on geographic information systems data (2001).² Acres recommended and not recommended for wilderness designation are taken from the "Oregon Wilderness Final Environmental Impact Statement" (1989); these acres may not equal totals shown, since totals are based on more accurate geographic information system data (changes are not the result of any boundary changes).³ Acreages listed only include the portion located within the LRA. The remainder of the WSA falls within the Burns District.⁴ These WSA's are managed by the Burns District.

Deep Creek, Honey Creek, Little Honey Creek (all of which flowed through both BLM- and USFS-administered land), Dairy Creek, and the South Fork of the Sprague River (which flows through USFS-administered land). In these coordinated efforts, the only BLM-administered river stretch found to be eligible was Honey Creek (USDI-FS and USDI-BLM 1995, 1996b).

In preparation for this RMP, an evaluation of the remaining streams in the LRA was conducted during 1997 and 1998 (USDI-BLM 1999c). An interdisciplinary team evaluated all possible drainages which were known to be perennial or intermittent, along with many springs, lakes, and drainages whose character was unknown. From this list, it was determined which streams were free-flowing and if they had any outstandingly remarkable values. It was determined that two rivers were eligible for further study: Guano Creek and Twelvemile Creek. These creeks were tentatively classified concerning their degree of naturalness. Table 2-35 lists the eligible creeks and their classification.

Subsequent field checking of Guano Creek revealed

that the last 1 mile of the creek above the Shirk Ranch has several major diversions and channels for irrigation use. These structures do not meet the "free-flowing" definition of the "National Wild and Scenic River Act," and therefore, the last mile of the creek was not included in the assessment. Since the Shirk Ranch is within this stretch, the outstandingly remarkable cultural value of the assessment was also dropped. Guano Creek is still eligible based on its vegetation communities.

Guano Creek Wilderness Study Area Cooperative Management Area

This area consists of about 11,020 acres of the Guano Creek WSA (about 94 percent of the total area) (Map SMA-1 of the Draft RMP/EIS) immediately south of Hart Mountain National Antelope Refuge. This area is currently managed in accordance with the "Hart Mountain National Antelope Refuge Comprehensive Management Plan" (USFWS 1994a, 1994b), the draft plan amendment/environmental assessment prepared jointly by the USFWS and BLM (1998a, 1998b), the "Oregon Public Lands Transfer and Protection Act" of

Table 2-35.—Summary description of drainages found to be eligible for wild and scenic river designation

River	Segment description	Total segment length (miles)
Guano Creek	Western boundary of Guano Creek WSA to BLM Road 6106A	<u>10.6</u>
Twelvemile Creek	California border to confluence with Twentymile Creek (includes BLM Surprise Field Office)	6.6
Honey Creek	Near confluence with Snyder Creek to one mile west of junction with County Road 3-10.	5.6
Total		22.8

1998, and the wilderness IMP (USDI-BLM 1995b). No livestock grazing is allowed. The use of prescribed burning is emphasized to restore native vegetation communities. Management emphasis is for wildlife habitat values.

Significant Caves

Introduction

The “Federal Cave Resources Protection Act” of 1988 declared that significant caves are an invaluable and irreplaceable part of the Nation’s natural heritage, and directed Federal agencies to secure, protect, and preserve significant caves for the perpetual use, enjoyment, and benefit of all people. The Act also directed Federal agencies to prepare and maintain a list of significant caves and to establish criteria for the identification of significant caves on Federal lands. The resulting cave management regulations were published in the *Federal Register* (USDI-1993) in 1993. Until caves within the LRA are evaluated to determine significance, and management plans are prepared which provide specific management prescriptions, all caves are to be managed in accordance with “Oregon and Washington Interim Cave Management Policy” (USDI-BLM 1995i). This policy provides for specific protective management of all caves and cave resources until a specific management plan is prepared. Many of the known caves within the LRA are also located in WSA’s, and these caves are afforded added protection under the wilderness IMP (USDI-BLM 1995b).

For a cave on public lands to be nominated, it must possess one or more of the following values: biota, cultural, geologic/mineralogic/paleontologic, hydrologic, recreational, or educational. The listing of significant caves involves two separate processes. During 1995, the initial listing process was coordinated by a national interagency effort in consultation with individuals and organizations interested in cave resources. This process had three steps: (1) nomination, (2) evaluation, and (3) listing.

Existing Conditions

There are presently seven significant caves located within the LRA. Depending on funding and staffing levels, management plans for any known significant caves would begin development in fiscal year 2003. As part of the evaluation process, interested individuals and organizations would be consulted as allowed within the parameters of the confidentiality provisions set in 43 CFR, Subpart B, Section 37.12. During the initial listing in 1995, nine caves were nominated by the Willamette Valley Grotto. Seven of these caves were found to be significant and are protected under interim management of the “Federal Cave Resources Protection Act.” A subsequent listing of 62 caves was received in late 1995. Seventeen of these were eliminated from further review because they were duplicates of the first list, were on private land, or did not meet the definition of a “cave.” Forty-five caves need to be evaluated before a determination on listing can be made. Depending on funding and staffing levels, the inventory and evaluation process would be completed within 5 years after the completion of the resource management plan for the LRA. After the inventory and evaluation process has been completed, a management plan for all new caves determined to be significant would be developed. This process would include public involvement. Because a separate management plan will be developed outside of this planning effort, caves will not be addressed further in this document.

Cultural and Paleontological Resources

Introduction

When the first Europeans came through this part of Oregon, four Native American Tribes were the primary occupants or visitors in what is now the planning area. The Northern Paiute occupied most of the area. The Yahuskin Band of the Northern Paiute occupied the north around Silver Lake, Christmas Valley, and

Summer Lake, while the Fort Bidwell and Harney Valley Bands lived in the eastern and southeastern portions of the area. Native people from the Warm Springs area to the north, and Klamath and Modoc from the west, would have also used portions of the resource area. It is unclear what Tribe or Tribes held the territory on a consistent basis during precontact periods. Evidence in the archaeological and ethnographic record indicates that groups moved, changed, or vacated the land. Indigenous people have lived in what is now the resource area for thousands of years. Today's borders and boundaries for historic ethnic groups are a product of Federal and state government politics rather than of Tribal selection.

The resource area's archaeological record is one of the richest in the Nation in terms of site numbers and age. Evidence, reflected in the tools and other man-made materials, exists in the LRA for some of the earliest occupation in North America. These periods of occupation or cultural periods are determined by the types of points found on spears or arrows. The Clovis Period, presently the earliest described cultural period in North America, dates from about 12,000 to 10,000 years ago. Following the Clovis Period, the Stemmed Point Period was present from about 10,000 to 7,500 years ago. Following this was the Desert Culture Period, which lasted until the period of the historic Tribes of the area and contact with Europeans.

Archaeological or cultural sites range from small lithic scatters (areas of stone tool debris) of only a few flakes to large lithic workshops at quarry locations that cover many square miles. There are village locations, small temporary campsites, hunting stations, hunting blinds, game drives, rock art, spiritual sites, burial and cremation sites, and collecting sites present within the resource area. Areas with water and resources such as food plants and stone for toolmaking can be found at the main locations of these sites. Within the site areas, places of traditional cultural use are present.

Traditional Cultural Properties, National Register Sites, and Cultural Resources

Federal agencies are responsible for the management and protection of cultural resources on lands under their administration. This management and protection must be done in coordination and consultation with those Native American Tribes directly connected with the land. Through a group of laws beginning with the "Antiquities Act" of 1906, FLPMA, the "Archaeological Resources Protection Act," the "National Environmental Policy Act" (NEPA), and the "Historic Preservation Act" (1966, as amended in 1992), the BLM is

mandated to identify, protect, and manage cultural resources on BLM-administered lands. A number of procedures, including those specified in 36 CFR 800.4(a), are used to identify cultural resources within the planning unit. In most cases, the BLM avoids cultural sites and does not subject them to mitigation. If avoidance is not possible, appropriate mitigation procedures are worked out in coordination with Native Tribes, the State Historic Preservation Office, and Advisory Council on Historic Preservation. Wherever possible, site protection is provided through law enforcement patrols, site monitoring, and site stewardship programs.

Traditional Cultural Property

A traditional cultural property is a place that is eligible for inclusion in the National Register of Historic Places (NRHP) because of association with cultural practices or beliefs of a living community that (1) are rooted in that community's history, and (2) are important to maintaining the continuing cultural identity of the community. Within the LRA, several such cultural sites have been identified through consultation with Tribal governments. While these areas have been identified, they have not yet been listed in the NRHP and, as such, are considered potential traditional cultural properties. The identified potential traditional cultural properties are not considered to be all-inclusive, however. As projects in the region are proposed, new traditional cultural properties may be identified. This is because Tribal members are often unwilling to identify places which they are using unless identification is absolutely necessary to protect the area from destruction or other conflicting use. Many practices conducted at such sites require privacy. In addition, public identification of such locations creates a potential problem in that these sites may be subsequently used for non-Native practices. The majority of the identified traditional cultural properties are currently under consideration for designation as ACEC's for future management and protection.

National Register Sites

National register sites are sites (which may include traditional cultural properties) which have been determined to be eligible for inclusion on the NRHP. Eligibility is determined on criteria established by the 1966 "National Historic Preservation Act." Sites are unique, provide information important to the study of history or prehistory, and are connected to important historical events or persons.

Abert Rim National Register District and Potential

Traditional Cultural Property

The Abert Rim area contains a National Register District for cultural resources (Map SMA-1 of the Draft RMP/EIS). Nomination of the district was based on the presence of large numbers of house pits, stone house rings, lithic scatters, plant processing areas, rock art, and other cultural features. The Abert Rim area has one of the highest site densities within the Northern Great Basin, and sites cover all time periods of the archaeological record. The area is important to members of the Northern Paiute for plant gathering, protection of the archaeological sites, and continuation of cultural practices. For these reasons, the area has potential to be designated as a traditional cultural property. This area is further described in the ACEC section and is shown on Map SMA-4 as the proposed Abert Rim ACEC.

Management concerns for the Abert Rim Area are:

- Continued improvement of U.S. Highway 395 would most likely further disturb archeological sites within the right-of-way. While mitigation of the archaeological content of these sites would be performed, it is likely the sites will be destroyed.
- Degradation and inappropriate use of cultural features which are important to the Native Peoples of the area.
- The Tribes have expressed a concern for both known and unknown Native American burial sites located within the area and for plant resources in the upland portions of the rim and would like these burial sites and plants protected.

Greaser Petroglyph National Register Site

This site is a large boulder located on the eastern side of Warner Valley. Petroglyphs and some pictographs have been created on the surface of the rock. These ancient designs are estimated to date between 500 and 6,500 years old.

Management concerns for Greaser Petroglyph Site are:

- In the past, vandals have attempted to remove those portions of the boulder containing designs.
- The rock has been vandalized (there are scratches on its surface).
- The boulder is fractured and portions of it have

fallen away or have been removed from the site.

Picture Rock Pass National Register Petroglyph Site

This is a series of boulders in the pass that contain rock art. In addition, other cultural sites, such as lithic scatters and campsites, are present in the area. The designs on the boulders are estimated to date from 500 to 1,500 years in age.

Management concerns for the Picture Rock Pass area are:

- The rock art at the site has been subjected to some vandalism.
- Digging, in what can only be assumed to be an attempt to look for buried artifacts, has occurred in the area of the boulder containing the rock art.
- Some New Age rock art has been placed at the site.
- Tours of the area are encouraged by local businesses.

High Lakes Potential National Register and Traditional Cultural Property Area

The High Lakes Area contains one of the largest concentrations of rock art in North America, as well as lithic scatters (stone tool debris), village locations, temporary campsites, plant collecting/processing sites, burial sites, and rock quarries of archaeological value. The oldest dated rock art site in North America is located in this region. The area shows evidence of having been a major plant gathering and occupation region for more than 10,000 years. Plants which were gathered in the area in antiquity are still present in the area for collection by Northern Paiute. The Northern Paiute Tribes of the region have expressed great interest and concern for the proper management and use of the archaeological and plant resources of the area. The existing management framework plan identifies this area for special management. The High Lakes area is shown on Map SMA-4.

Management concerns for the High Lakes Area area:

- The protection of the rock art sites in the area.
- Site vandalism.
- Sites are being used in ways which conflict with Native American values. Examples are New Age

religious practices, modification with chalk for photos, building campfires against them, destruction of the sites by others who consider them to be devil worship, and non-Native use for financial gain.

- The commercial visitation of such sites may increase their rate of deterioration. Artifact collecting is a problem, up to and including the removal of the rock art with rock saws. Sites associated with rock art are being looted by digging.
- Concern has been expressed by the Tribal groups that competing use of the plant resources could lead to a reduction in plants, making traditional uses difficult.

Rahilly-Gravelly Potential Traditional Cultural Property Area

This is an area containing cultural resource sites. The Northern Paiute gather plants that are culturally important. This area is shown on Map SMA-4. Site types in the area include rock art, stone rings, lithic scatters, and hunting stations. Obsidian quarry areas are also found in the area. The location shows evidence of having been a focal point of plant collection and occupation for more than 8,000 years. Within this same area, yampa or epos, a root plant used for food, can be found and collected in abundance most years. This plant is important in the maintenance of Native American traditions.

Management concerns for the Rahilly-Gravelly Traditional Cultural Property Area are:

- Native Tribes have expressed concern that the quality of the plants around Rahilly-Gravelly be maintained or improved.
- Sites within the area are subject to illegal artifact collection.
- The rock art in the area is subject to vandalism and theft. In some locations, attempts have been made to remove the rock art.
- There is concern that competing uses for collection of the plants could become a problem.

Tucker Hill Traditional Cultural Property Area

The plants and features in the vicinity of Tucker Hill are critical for the continuation of the Northern Paiute's

cultural practices. The area also contains numerous archaeological sites.

Management concerns for the Tucker Hill Traditional Cultural Property Area are:

- There has been mining in the north end of the Tucker Hill formation. Within the proposed area, mining is incompatible with the cultural values that need to be protected.
- Artifacts have been illegally removed from the area.

Table Rock Traditional Cultural Property Area

Through consultation with Tribal leaders, BLM has identified the area around Table Rock as significant to the Klamath Tribes (Map SMA-4). The location contains numerous archaeological materials as well as features of a cultural nature, which are important to the Klamath Tribes and the Northern Paiute. Some locations on the formation have been found to contain burials, making this formation a sensitive area for local Tribes.

Management concerns for the Table Rock Traditional Cultural Property Area are:

- The Table Rock area is one of the highest formations in the Christmas Valley/Fort Rock area. It has been used for many years as a communication site. A road and power line were constructed up the side of the formation in the early 1960s to provide access and power to the site. Construction of the original buildings and towers on the top reportedly destroyed a number of features. The site continues to be used for communications.
- On several occasions in recent years, additional structures and towers have been added to the location. These are considered additional impacts upon the cultural features of the area.
- The collection of artifacts and improper use of cultural features is aided by the presence of the road to the top of the formation.

Cultural Plant Species

Through treaties with the Federal government and regulatory acts signed over the past 30 years, Indian Nations have reserved rights and recognized interests to harvest a broad range of native plant species from

the public lands (USDI-BLM 1995g; Housley and Hanes 1998). Therefore, sustainable harvest levels of the various species is a management goal. Indian governments consider availability of these species a trust responsibility of the Federal government. Inadequate quantities can lead to substantial effects on community well-being, because numerous social activities center on the harvest, preparation, and consumption of the resources. Tribal contacts have stated that they presently have a small land base and must rely on public land resources for their needs. Continued access to public land is necessary for the continuance of Tribal culture (Jerofke, L., personal communication). The occurrence of culturally important plant species may be measured by the health of the plant communities in which they are found (Table 2-36). The BLM will retain confidentiality of specific Tribal plant use sites by analyzing the impacts of management actions on those broader plant communities.

Cultural Plant Ethno-Habitats

Cultural plants are defined as those plants important to Tribal groups, both past and present, for subsistence, economic, and ceremonial purposes. Ethno-habitats are plant habitats defined by Tribal people as having human importance. Various historical factors since European contact have affected the availability of cultural plants for Tribal use within the planning area. The invasion of noxious weeds; the exclusion of fire; and impacts from grazing, timber harvest, and road building; among other factors; have all contributed to declines and dislocations in many of the plant species important to Tribes within the interior Columbia Basin (Hanes, R., personal communication). There is great concern by Tribal peoples, anthropologists, botanists, and Federal land managers to protect the habitats where cultural plants are located.

Table 2-36 shows important cultural plants found in the planning area, and Table 2-37 shows ethno-habitats. Some areas have been identified, which have large populations or large number of species of cultural plants concentrated in relatively small areas. These areas have been proposed as ACEC's.

ICBEMP concludes that Tribal plants occurring in nonforested habitats are most at risk for decreases in habitat that may influence continued harvestability (Croft, L., and Helliwell, R., personal communication). Plants of considerable importance occur in the nonforested low sagebrush lithic soils habitat of BLM lands. Today, such plants as biscuit root (*Lomatium* species), wild onion (*Allium* species), bitterroot

(*Lewisia rediviva*), yellow bell (*Fritillaria pudica*), balsamroot (*Balsamorhiza* species), and yampa or epos (*Perideridia* species) are important to the maintenance of indigenous cultures through ceremonies and other cultural activities. These plants were once critical to the very survival of the Tribe. In the spring, while Tribal people were at the root camps located on lithic soils, the women dug roots and gathered plants, and the men hunted greater sage-grouse hens and other game (Kelly 1932).

The ethno-habitat described as "wet meadows" is another plant community in need of special management. Camas (*Camassia quamash*), tobacco root (*Valeriana edulis*), bistort (*Polygonum bistoides*), and wapato (*Sagittaria latifolia*) are cultural plants of concern that grow in wet meadows. Historic livestock overgrazing has caused stream cutting and lowering of the water table, followed by loss of the plant habitat. Wapato in the Chewaucan wetlands was a major food source for Tribal people at the time of European contact. Today, much of the Chewaucan wetlands is under private ownership, and little wapato is found in the area because of habitat loss and lack of water. The marsh has been channelized, drained, and is managed for hay production.

Paleontological Resources (Prehistory)

Paleontological resources consist of the fossil remains of plants and animals. These animals and plants may be either extinct or extant today in the resource area or elsewhere. Within the resource area, there are several areas which are known to contain plant and animal fossil remains.

Fossil Lake

Fossil Lake, in northern Lake County, is currently part of a larger RNA/ACEC area known as the Fossil Lake/Sand Dunes/Lost Forest RNA/ACEC. This ACEC was created to protect fragile and rare fossils, manage the Sand Dunes of the area, and protect an isolated island of ponderosa pine or disjunct forest. Considerable research, starting with Smithsonian work in the late 1800s, has been conducted within the Fossil Lake portion of the ACEC. Each year for the past 12 years, the BLM has worked cooperatively with the South Dakota School of Mines to conduct paleontological research and salvage fossils in the area. A large collection of materials resulting from this work is housed cooperatively at the South Dakota School of Mines in Rapid City, South Dakota. It is maintained, curated, and made available for study. Other collections are located at the Smithsonian and University of

Table 2-36.—Native American cultural plants of the planning area

Common name	Scientific name	Habitat
balsamroot	<i>Balsamorhiza</i> spp.	Dry hillsides
biscuit root	<i>Lomatium</i> spp.	Lithic soils
bitterroot	<i>Lewisia rediviva</i>	Lithic soils
camas	<i>Camassia quamash</i>	Wet meadow
cattail/tule	<i>Typha</i> species/ <i>Scirpus</i> spp.	Marsh wetlands
chokecherry	<i>Prunus</i> spp.	Riparian
cow parsnip	<i>Heracleum lanatum</i>	Moist meadows, woodland edges
currant/gooseberry	<i>Ribes</i> spp.	Riparian, meadow edges, talus
coyote tobacco	<i>Nicotiana attenuata</i>	Disturbed areas (after fire)
dogbane (Indian hemp)	<i>Apocynum cannabinum</i>	Wet hillsides, riparian
elderberry	<i>Sambucus</i> spp.	Riparian
huckleberry	<i>Vaccinium</i> spp.	Forested areas (pines/mixed conifers)
hyacinth	<i>Brodiaea hyacinthina</i> (syn. <i>Triteleia hyacinthina</i>)	Open grasslands to rocky open flats
juniper	<i>Juniperus occidentalis</i>	Hillsides, ridges, riparian
red-osier dogwood	<i>Cornus stolonifera</i>	Riparian
sedge	<i>Carex</i> spp.	Wet meadows, riparian
sego or mariposa lily	<i>Calochortus</i> spp.	Sagebrush community, dry, open slopes/flats
serviceberry	<i>Amelanchier alnifolia</i>	Riparian
tobacco root	<i>Valeriana edulis</i>	Wet meadows
wapato (arrowhead)	<i>Sagittaria</i> spp.	Ponds, lakeshore, wet marsh
western spring beauty	<i>Claytonia lanceolata</i>	Wet woodlands, meadows
wild onion	<i>Allium</i> spp.	Dry hillsides; plains
willow	<i>Salix</i> spp.	Riparian
wocas, water lily	<i>Nuphar polysepalum</i>	Lakes, wetlands
yampah, epos	<i>Perideridia</i> spp.	Lithic soils
yellowbell	<i>Fritillaria pudica</i>	Lithic soils

Source: Housley and Hanes (1998).

California at Los Angeles.

Fossil Lake is a small, dry lakebed in the approximate center of a large fossil-bearing deposit located in the Christmas Valley/Fort Rock Basin. The area covers nearly 10,000 acres of known fossil-bearing deposits. The full extent of the remains has not been determined. The fossil deposits are of the Holocene Epic, ranging from about 50,000 to 8,000 years before the present. The fossils overlap to some extent with cultural deposits of the 12,000-to-8,000-year before present period. There is some indication of hunting in this area during this time period. It is also possible that there was hunting of now-extinct game such as mammoth, sloth, camel, and bison. The area is extremely rich in mammal, bird, and fish fossils. It has been determined that there are several rock layers, each of which represents a different time period and each containing a different assortment of fauna. Fossil Lake is the type site (first

location found) for many North American Holocene Age (recent) fossils. It is reported to be the richest site for fossils from this era outside of the La Brea Tar Pits in California.

Fossil Lake is an actively eroding basin. Because the sediments are mostly volcanic in nature and are loose and unconsolidated, they erode easily. Wind storms sweep the basin and remove large amounts of sediment and carry it away. Some of this material is deposited in the active sand dunes to the east, which are a part of the ACEC. Because of this erosion, new fossils are exposed on the surface each year. Often these remains are still partly articulated (segmented). If they are not collected, these remains become weathered and scattered, causing them to lose much of their scientific interest.

To help protect the fossils, which are extremely fragile

Table 2-37.—Cultural plant ecological groupings (ethno-habitats)

1) Lithic soils ¹	<i>Artemisia rigida</i> , <i>A. arbuscula</i> , geophytes (lomatium, bitterroot)
2) Wet meadows ¹	Camas, bistort, sedge, tobacco root
3) Riparian areas ¹	Willow, redosier dogwood, currant, rose
4) Marsh/ponds ¹	Palustrine: sedges, rushes, tule, wapato; lacustrine: wocas
5) Sand dunes	Indian ricegrass, other grasses
6) Sagebrush	With bunchgrasses; with mountain mahogany
7) Woodlands	Juniper with bitterbrush, sagebrush, manzanita, quaking aspen, grasses, Ponderosa pine
8) Colluvium, alluvium, talus slopes	<i>Ribes</i> spp., serviceberry
9) Desert saltbrush	<i>Atriplex</i> spp., <i>Sarcobatus vermiculatus</i>
10) Saltflats/playas	Waada, saltgrasses
11) Dry meadows	Grasses, surrounding shrubs
12) Vernal pools	Onions, camas
13) Disturbed areas (road sides, flooded areas, landslides)	Weedy species

¹ Plant communities “at risk” with decreases in area size.

Source: USDI-BLM (1995g)

when exposed on the surface, an area of 6,660 acres was closed to off-highway vehicle (OHV) use in the early 1970s. Livestock were removed from the area, and it is now fenced to prevent vehicle and livestock entry. Currently, only foot traffic is allowed within the closure area.

Management concerns for Fossil Lake are:

- The deposits are subjected each year to heavy erosion. This causes the fossils to be exposed on the surface of the ground, where they are weathered and scattered, causing a loss of their scientific value.
- The area of the deposits is not fully included in the area of vehicular and livestock closure. Large areas of significant fossils can be found within the area to the east in the sand dunes. These areas are open to use by dune buggies and other OHV's, which destroy fragile fossils (such as articulated fish fossils).
- The area is also subjected to illegal fossil collecting by collectors and commercial vendors.

Simontacchi Camel Location

This location was discovered in 1997 by the BLM and reported to the paleontological community for study. Since that time, it has been examined by the South Dakota School of Mines paleontologists. This location

contains large amounts of camel and other vertebrate fauna. It is important because of the large number of camel remains present in the deposits. This location, in loose, ashy deposits, is a series of small knolls with draws between them. Fossils have been and are continuing to be exposed on the surface by both wind and water erosion. Once exposed on the surface, these fossils are subject to weathering and scattering by erosional forces.

Management concern for the Simontacchi Camel location is:

- There is a need for the continued collection of exposed remains. Currently, the South Dakota School of Mines devotes only 1 or 2 days per year to collecting and curating fossils from this location. This work is not adequate to properly find, collect, and curate the fossils eroding from the deposits. Collections could be made more frequently and for a longer period for each gathering than is currently being done.

Rattlesnake Butte Formations

The Rattlesnake Butte Formations, located within the Beaty Butte region of the LRA, were identified by the USGS. Their full extent and faunal content have not been determined. The fossil deposits are a tan/brown volcanic tuff, which is exposed in many locations throughout the region. Fossils here are of the Miocene age, estimated by some scientists to date from 5 million

to 23 million years in age. Remains include rhinoceros, elephant, horse, camel, and a wide range of other vertebrate fauna. Since the geologic deposits which contain the fossils are relatively compact and hard, erosion bringing the fossils to the surface is slow. In addition, the deposits are exposed in vertical rather than horizontal faces, making the amount of material exposed at any particular time relatively small.

Management concerns for Rattlesnake Butte Formations are:

- This location should be surveyed further to determine the full extent of the fossils within the area.
- Collections should be made of the exposed fossils and they should be properly curated for study and use by the public.

Historical Resources

Within the LRA, many locations contain remains from Lake County's history. On scattered locations, the remains of old line shacks that served as shelters for cattlemen and sheep herders can be found. These are usually one-room board and batten structures of simple construction. Most have fallen down and remain only as piles of weathered boards, nails, and broken glass. Within the Fort Rock/Christmas Valley area, nearly all of the old homesteads, towns, and businesses are gone. Other historic sites include the remains of historic roads and trails, Civilian Conservation Corps camps and project locations, abandoned mines and mine processing locations, ranch houses, corrals, cemeteries, and abandoned logging/sawmill locations.

Historical Resources in Need of Special Management

Shirk Ranch Property

The Shirk Ranch is located in the northwest portion of the Guano Valley. The complex consists of the main ranch house, a yard, a fence around the house, a well, well house, and water tower, two root cellars, an outhouse, two bunk houses, an old corral, an old barn location, an old house foundation, a burned building foundation and chimney, a blacksmith shop, a chicken coop, a cemetery, and other ranch features in the fields and ditches of the property.

The Shirk Ranch, which was built in the late 1800s, is important in regional history. It has been determined to be one of the finest extant examples of High Desert ranching in existence. It is a destination for many

history buffs in the region. It is eligible for inclusion in the NRHP.

Management concerns about the Shirk Ranch Complex are:

- Because of neglect, the standing buildings and features of the Shirk Ranch are in need of immediate stabilization and repair.
- If a fire burns through the area, the buildings at the ranch would be subject to destruction because of the brush and grass surrounding them.
- Vandalism of the buildings is becoming a problem and artifacts from the property are being stolen at an increasing rate.
- Plans are being developed for the proper stabilization, use, and maintenance of the site.

Oregon Central Military Road

The Oregon Central Military Road, which crosses much of the southern portion of the district, has several areas where features of the road exist in original condition. The road was built from Eugene, Oregon, to Fort Boise, Idaho, to move troops and supplies. Of the portions of the road which are in original condition (including ruts in rocks), the Stone Bridge in the Narrows between Crump and Hart Lakes and the unbladed portion are of national significance.

Management concern about the Oregon Central Military Road is:

- Those portions of the road which are in original condition should be protected from vehicle traffic and artifact collection.

Human Uses and Values

Introduction

The LRA encompasses most of Lake County and a portion of Harney County. A small portion of Washoe County in Nevada is included in the area covered by the RMP. To effectively compile an economic profile of the planning area, Lake and Harney Counties were selected as the analysis unit.

The primary economic center of Lake County is the town of Lakeview. Lakeview is the county seat and the

location of many Federal, State, and local government offices. Most basic goods and services are available in Lakeview. The area is also strongly tied to the city of Klamath Falls, located 95 miles west of Lakeview in Klamath County. A greater diversity of firms and most specialty services are available in Klamath Falls.

The major economic center of Harney County is the Burns/Hines area. These communities are located approximately 50 miles northeast of the planning area boundary. Other regional business centers include Medford and Ashland in Josephine County, Bend in Deschutes County, Portland, and Reno.

The nearest community with commercial air service is Klamath Falls. Lakeview is served by a rail spur line that links to Alturas, California. The nearest Amtrak service is in Klamath Falls. A small, commercial van line operates between Lakeview and Klamath Falls.

Several smaller communities are located within the RMP area. Paisley is an incorporated community, while Adel, Christmas Valley, Summer Lake, Fort Rock, and Silver Lake are unincorporated communities in Lake County. These smaller communities generally have very limited services for residents and visitors: fuel, a campground, a motel or resort, a small store, a restaurant, and one or two churches.

Summary of ICBEMP Economic Findings

ICBEMP examined the Lake and Harney County areas generally and the communities of Lakeview, Paisley, Burns, and Hines specifically. The smaller, unincorporated communities of Adel, Christmas Valley, Summer Lake, Fort Rock, Silver Lake, and Blitzen were not examined. Lake County is located in the Bend/Redmond trade center. USFS lands are 19.3 percent of the land base and BLM, 48.7 percent. These public lands offer primarily roaded natural and primitive/semiprimitive recreational settings, but visitation is low. Harney County is located in the Boise trade center. USFS lands are 8 percent of the land base in Harney County, and BLM lands (including lands in the Burns District) represent 62 percent of the land base. These public lands offer primarily roaded natural and primitive/semiprimitive recreational settings, but visitation is low (USDA-FS and USDI-BLM 1997).

The ICBEMP concluded that Lake County and Harney County are areas of low economic and social resiliency (USDA-FS and USDI-BLM 1997). This determination is based on their dependence on public land timber and forage and the fact that 20 percent of the Lake County budget and 21.3 percent of the Harney County budget

are derived from Federal land payments.

Lakeview, Paisley, Burns, and Hines are analyzed in “Economic and Social Conditions of Communities: Economic and Social Characteristics of Interior Columbia Basin Communities and an Estimation of Effects on Communities from the Alternatives of the Eastside and Upper Columbia River Basin Draft Environmental Impact Statements” (Reyna 1998). This document identifies Lakeview as an isolated trade center with medium timber employment specialization and high government employment specialization. Paisley is determined to have very high agricultural employment specialization, low timber employment specialization, and low government employment specialization. Burns is determined to have high timber employment specialization and medium agricultural employment specialization. Hines is determined to have very high timber employment specialization and high agricultural employment specialization (Reyna 1998).

Population, Age Distribution, and Ethnicity

Lake and Harney Counties are among Oregon’s least populated counties. Except for Lakeview and the Burns/Hines area, the two counties are primarily rural in character. Table 2-38 displays the census population in 1980, 1990, and 2000 for Lake County, Lakeview, and Paisley, and for Harney County, Burns, and Hines.

Lake County has a relatively high percentage of population ages 65 or older. Estimates for 1997 were 1,211 or 16.4 percent of the population. There were an estimated 1,912 people in the under-18 age group (25.8 percent) and 4,277 in the 18–64 age group (57.8 percent). Harney County has a relatively high percentage of population ages 65 or older. Estimates for 1997 were 1,121 or 14.9 percent of the population. There were an estimated 1,881 in the under-18 age group (25.1 percent) and 4,498 in the 18–64 age group (60 percent). Age distribution for the State in 1997 was as follows: 0–17 is 25.6 percent of the population; 18–64, is 60.8 percent; and 65+ is 13.6 percent (Wineburg 1998). Information on age distribution and immigration suggests that Lake and Harney Counties are not attracting large numbers of retirees.

Lake and Harney Counties have limited ethnic diversity. Native Americans are represented at a rate greater than statewide in Lake County. They are also a measurable ethnic group in Harney County. Persons of Hispanic heritage (any race) are also well represented, but at rates less than statewide—in Lake and Harney Counties at 3.8 and 3.1 percent of the population, respectively (Frewing-Runyon 1999).

Table 2-38.—Census population

Locality	Census		
	1980	1990	2000
Oregon	2,633,156	2,842,321	3,421,399
Lake County	7,532	7,186	7,422
Lakeview	2,770	2,526	2,474
Paisley	343	350	247
Unincorporated	4,419	4,310	4,701
Harney County	8,314	7,060	7,609
Burns	3,579	2,913	3,064
Hines	1,632	1,452	1,623
Unincorporated	3,103	2,695	2,922

Source: Edmunston (1998), Edmunston (2001), and Wineburg (1998).

Native American residents may participate in unique cultural practices associated with reserved treaty rights. Activities may include fishing, hunting, and gathering plant materials for food or ceremonial purposes. No reservation lands are located in Lake County, but the Klamath Tribe has reserved rights in the area (Cannon, B., *personal communication*). The Burns Paiute Tribe has a small reservation in Harney County, located near Burns. The Tribe was established by Executive order instead of by treaty and has no reserved treaty rights (Hanes, R., *personal communication*).

Agricultural activities in the two counties are not considered highly labor-intensive and are limited primarily to production of hay, forage, and livestock.

In some areas, collection of special forest products is closely associated with Hispanic and/or Asian ethnic groups. This type of activity occurs on forested lands in Lake and Harney Counties (Cannon, B., *personal communication*). The majority of these lands are managed by the Fremont, Deschutes, Ochoco, and Malheur National Forests.

No other ethnic groups in Lake or Harney Counties are known to be associated with public land resources through unique cultural, historical, or employment practices. Table 2-40 displays ethnic distribution for the United States, Oregon, and Lake and Harney Counties, and postal ZIP code areas within Lake and Harney Counties.

Employment and Wages

Lake County

In 2000, an estimated 3,070 people were working in Lake County. This included almost 800 self-employed persons. Wage and salary workers were more common, totaling 2,290. The lumber and wood product industry was the dominant manufacturing employer, with all but 10 of the 310 manufacturing employees. Lumber and wood products employment peaked in 1994 at 600, then abruptly declined to 250 in 1998 before beginning the current upward trend.

In 2000, Federal, State, and local governments employed 930 people—the greatest number of people employed by any sector. However, since 1992, government employment has decreased by 11.4 percent (State of Oregon, Employment Department, various years). During the fiscal year 1995, employment by Federal natural resource agencies in Lake County was as follows: BLM, 59; USFS, 165 (Renya 1998).

The trade sector employed 570 people in 2000, an increase of 16.3 percent since 1990. The services sector employed 260 people in 2000, an increase of 30.0 percent since 1990. Growth in the trade and services sectors during this period has been very slow when compared to the statewide trend: trade is up 25.8 percent, and services are up 48.1 percent. Overall, Lake County has been experiencing shrinking employment. The civilian labor force has decreased 12.9 percent, and wage and salary employment is down 6.5 percent since 1990 (State of Oregon, Employment Department, various years). Unemployment has also been increasing since 1990.

Table 2-39.—Gross farm sales in thousands (\$)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Oregon									
Grains	184,283	191,126	210,931	239,702	260,758	333,769	310,659	267,537	184,018
Hays and forage	97,983	92,156	85,833	110,251	115,493	128,372	148,737	189,826	150,972
Grass and legume seeds	216,162	210,874	191,122	201,315	222,483	239,808	316,973	343,191	342,763
Field crops	222,967	197,731	208,242	225,323	239,123	275,317	274,089	260,147	231,685
Tree fruits and nuts	140,312	157,121	175,322	141,806	146,116	167,501	164,291	235,243	193,324
Small fruits and berries	71,910	79,807	85,781	72,252	97,150	83,741	98,915	90,030	86,904
Vegetable crops	211,081	224,701	230,620	263,782	267,201	244,466	263,602	263,463	288,062
Specialty crops	604,362	607,303	765,883	90,938	892,237	940,294	869,656	939,673	930,258
<i>Subtotal of all crops</i>	1,749,060	1,760,819	1,953,734	1,345,369	2,240,561	2,413,268	2,446,922	2,589,110	2,407,986
Cattle and calves	415,652	413,583	400,938	410,602	376,683	340,293	252,141	342,835	389,160
Dairy products	214,422	205,196	226,898	214,577	218,897	216,589	237,009	218,073	245,454
Eggs and poultry	100,619	94,403	100,866	81,334	79,270	81,800	86,029	81,704	88,689
Miscellaneous animal products	87,394	85,443	75,678	83,923	82,428	89,119	75,218	75,284	74,937
<i>Subtotal of all animal products</i>	818,087	798,625	804,380	790,436	757,278	727,801	650,397	717,896	798,240
<i>Total gross agriculture sales</i>	2,567,147	2,559,444	2,758,114	2,135,805	2,997,839	3,141,069	3,097,319	3,307,006	3,206,226
Lake County									
Grains	545	374	492	430	821	795	925	259	348
Hays and forage	11,740	10,001	9,253	15,491	17,720	16,494	19,532	29,530	16,968
Grass and legume seeds	0	0	0	0	0	0	0	0	0
Field crops	261	345	348	40	40	30	10	15	396
Tree fruits and nuts	0	0	0	0	0	0	0	0	0
Small fruits and berries	0	0	0	0	0	0	0	0	0
Vegetable crops	0	0	0	0	0	0	0	0	0
Specialty crops	539	523	3,777	4,935	2,329	2,200	2,729	2,732	2,625
<i>Subtotal of all crops</i>	13,085	11,243	13,870	20,896	20,910	19,519	23,196	32,536	20,337
Cattle and calves	28,732	23,860	18,274	19,560	18,361	15,879	14,688	21,265	20,881
Dairy products	0	0	0	0	0	0	0	0	0
Eggs and poultry	0	0	0	0	0	0	0	0	0
Miscellaneous animal products	654	732	879	660	602	617	580	604	588
<i>Subtotal of all animal products</i>	29,386	24,592	19,153	20,220	18,963	16,496	15,268	21,869	21,469
<i>Total gross agriculture sales</i>	42,471	35,835	33,023	41,116	39,873	36,015	38,464	54,405	41,806
Harney County									
Grains	147	217	399	307	451	560	670	216	217
Hays and forage	3,067	3,265	3,518	4,356	5,182	5,242	6,371	9,098	10,356
Grass and legume seeds	68	66	35	46	46	46	46	46	51
Field crops	0	0	0	0	0	0	0	0	0
Tree fruits and nuts	0	0	0	0	0	0	0	0	0
Small fruits and berries	0	0	0	0	0	0	0	0	0
Vegetable crops	0	0	0	0	0	0	0	0	0
Specialty crops	331	625	399	1,075	1,957	2,275	2,664	2,209	2,209

	1990	1991	1992	1993	1994	1995	1996	1997	1998
<i>Subtotal of all crops</i>	3,613	4,173	4,351	5,784	7,636	8,123	9,751	11,569	12,833
Cattle and calves	28,500	27,341	26,909	24,537	22,550	19,821	19,786	26,376	23,018
Dairy products	0	0	0	0	0	0	0	83	82
Eggs and poultry	0	0	0	0	0	0	0	0	0
Miscellaneous animal products	548	541	630	731	764	813	730	876	908
<i>Subtotal of all animal products</i>	29,048	27,882	27,539	25,268	23,314	20,634	20,516	27,335	24,008
<i>Total gross agriculture sales</i>	32,661	32,055	31,890	31,034	30,950	28,757	30,267	38,904	36,841

Source: Oregon State University Extension Service, various annual reports.

Table 2-40.—Ethnic distribution, 1990 census

	White	Black	Native American	Asian or Pacific Islander	Other	Hispanic (any race)
United States	80.3	12.1	0.8	2.9	3.9	9.0
Oregon	92.8	1.6	1.4	2.4	1.8	4.0
Lake County	95.0	0.1	2.8	0.6	1.6	3.8
Adel	91.1	0.0	0.0	0.0	8.9	12.0
Fort Rock	100.0	0.0	0.0	0.0	0.0	0.0
Lakeview	94.4	0.3	1.6	1.1	2.6	4.1
Paisley	97.3	0.0	2.4	0.0	0.3	1.6
Plush	100.0	0.0	0.0	0.0	0.0	0.0
Silver Lake	96.3	0.0	1.1	2.2	0.4	2.7
Harney County	94.8	0.0	3.7	0.6	0.9	3.1
Burns/Hines	93.7	0.1	4.0	0.8	1.4	3.4
Crane	100.0	0.0	0.0	0.0	0.0	0.0
Drewsey	100.0	0.0	0.0	0.0	0.0	0.0
Lawen	98.4	0.0	1.6	0.0	0.0	2.8
Riley	98.7	0.0	0.0	1.3	0.0	0.0

Source: U.S. Department of Commerce (1999), and Frewing-Runyon (1999).

Harney County

In 2000, an estimated 3,600 people were working in Harney County. This included 820 self-employed persons. Wage and salary workers were more common, totaling 2,780. Major manufacturing employers, SMC and Louisiana Pacific, are located in the Burns/Hines area, outside the planning area. Manufacturing employed 490 people in Harney County (State of Oregon, Employment Department, various years).

Federal, State, and local governments employed the greatest number of people at 1,090 (State of Oregon, Employment Department, various years). During the 1995 fiscal year, employment by Federal natural resource agencies in Harney County was as follows: BLM, 60; USFS, 74 (Renya 1998).

The trade sector employed 570 people, up 16.3 percent from 1990 figures. The services sector employed 400 people in 2000, up 33.3 percent since 1990. However, growth in the trade and services sectors has been below

the statewide trends: trade is up 25.8 percent, and services are up 48.1 percent. Overall, Harney County has been experiencing growing employment. Unemployment has also been decreasing since 1996 (State of Oregon, Employment Department, various years).

Table 2-41 displays detailed employment information for Oregon and Lake and Harney Counties since 1970.

Per Capita Income and Poverty Rates

Lake County

Per capita personal income of \$20,285 in 1999 was significantly below Oregon's statewide level of \$26,958. Lake County also has a higher portion of income derived from transfer payments (22.5 percent) than the state as a whole (13.5 percent). Transfer payments include Social Security payments, Aid to Families with Dependent Children, unemployment compensation, disability payments, and other government payments. Typically, transfer payments are a major source of income for retirees and low-income people. The percent of income derived from dividends, interest, and rent in Lake County (25.5 percent) was similar to statewide figures (22.5 percent). This income represents returns on accumulated assets held by individuals and is often a large portion of income for the self-employed and retirees. Earned income, typically wages and salaries, was 52.0 percent of income in Lake County, significantly below the statewide 64.0 percent. Just as Federal, State, and local government is the dominant employer in Lake County, it is also the dominant provider of earned income at 45.3 percent (23.6 percent of all income). Statewide, Federal, State, and local government employment provides 17.6 percent of earned income, 11.2 percent of all income (U.S. Department of Commerce Bureau of Economic Analysis 2001).

Harney County

Per capita personal income of \$21,173 was significantly below Oregon's statewide level of \$26,958 in 2001. Harney County also has a higher portion of income derived from transfer payments (19.5 percent) than the state as a whole (13.5 percent). Total income derived from dividends, interest, and rent in Harney County (22.0 percent) was similar to the same kind of income statewide (22.5 percent). This income represents returns on accumulated assets held by individuals and is often a large portion of income for the self-employed and retirees. Earned income, typically wages and salaries, was 58.5 percent of income in Harney County, significantly below the statewide proportion of

64.0 percent (U.S. Department of Commerce Bureau of Economic Analysis 2001).

The poverty rate estimate for 1998 was 17.2 percent for Lake County. This compares to 12.1 percent for the State of Oregon. The poverty rate estimate for Harney County was 15.6 percent (U.S. Department of Commerce 2001). This statistic indicates that a higher proportion of people whose incomes are very low live in Lake and Harney Counties.

Revenue Sharing

BLM and USFS lands represent 69 percent of the land base in Lake County (USDI-FS and USDI-BLM 1997). Federal lands are not subject to state or local property taxes. In recognition of the state and county services that are provided (roads, emergency services, and law enforcement), Congress passed legislation in 1976 to provide Payments-in-Lieu-of-Taxes to all states and counties where public lands are located. The BLM is currently charged with making these payments on behalf of itself and other Federal agencies. Revenue is distributed using a complex formula based on acres of Federal land, population, and the total of the previous years' revenue sharing from resource-use collections (timber, range, mining, and so forth). Previous years' payments are shown in Table 2-42.

Local Economic Activity Generated by Public Land Resources

Introduction

The BLM and other Federal land management agencies often make commodities available for use by the private sector. Both the BLM and USFS make range-lands available to private ranchers for livestock grazing on a renewable permit basis. A fee is collected for each grazing head of livestock. Similarly, the BLM and USFS sell timber to private firms. In the planning area, however, the BLM manages no forested land for commercial harvest (see Table 2-43).

Agriculture and Livestock Grazing

Because of a cold, dry climate and short growing season (Sunset Publishing Corporation 1995), the agricultural industry centers on just a few products. The most common is the raising of cattle and calves for beef. In 1996, an estimated 86,690 head of cattle and calves were in Lake County, and an estimated 124,960 head of cattle and calves were in Harney County (Oregon State University 1997). Within the study area,

Table 2-41.—Employment by sector: Statewide; Lake and Harney Counties; 1970–2000

Sector	1970	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Oregon													
Civilian labor force	864,500	1,295,000	1,491,000	1,508,000	154,200	1,596,000	1,640,000	1,652,700	1,719,700	1,727,600	1,763,700	1,761,100	1,802,900
Unemployment	61,700	107,000	82,000	90,000	116,000	116,000	89,000	80,100	101,600	100,700	98,600	100,400	87,500
Total wage and salary employment	709,200	1,044,600	1,251,900	1,250,800	1,274,200	1,308,400	1,362,900	1,418,400	1,474,600	1,526,400	1,551,800	1,575,100	1,603,300
Total manufacturing	172,300	215,100	220,300	211,700	209,000	211,700	221,300	229,300	235,800	243,600	246,100	242,200	243,000
Lumber, wood, and paper products	76,200	79,900	73,200	65,800	63,800	62,700	63,300	61,300	59,800	60,200	59,000	57,800	56,900
Other manufacturing	96,100	135,200	147,100	145,900	145,200	149,000	158,000	168,000	176,000	183,400	187,100	184,400	186,100
Total nonmanufacturing	536,900	829,500	1,031,600	1,039,000	1,065,200	1,096,700	1,141,600	1,189,100	1,238,900	1,282,800	1,305,700	1,332,800	1,360,300
Construction and mining	30,800	48,800	54,000	53,000	52,000	55,700	62,900	70,400	79,400	83,300	83,400	85,200	87,600
Transportation, communications, and utilities	48,700	60,500	64,500	65,200	65,700	66,800	68,900	71,300	73,500	74,900	76,200	77,800	79,900
Trade	162,000	255,600	313,100	314,300	318,700	328,900	344,100	357,000	365,900	377,500	383,400	388,000	394,000
Finance, insurance, and real estate	36,000	70,000	80,300	83,200	86,000	84,600	87,800	87,200	91,000	94,800	95,200	95,100	94,000
Services and miscellaneous	112,700	191,400	296,200	296,900	311,800	328,300	343,200	362,900	382,600	402,800	412,100	425,600	438,800
Government	146,700	203,200	223,500	226,400	231,000	232,600	234,700	240,200	246,600	249,500	255,300	261,300	266,000
Lake County													
Civilian labor force	2,790	3,600	3,890	3,840	3,750	3,850	3,940	3,710	3,890	3,760	3,460	3,350	3,390
Unemployment	260	390	370	310	330	370	330	320	460	440	410	340	320
Total wage and salary employment	1,840	2,430	2,310	2,340	2,410	2,460	2,520	2,470	2,440	2,330	2,160	2,170	2,290
Total manufacturing	410	450	410	410	470	550	610	510	440	390	280	300	310
Lumber and wood products	380	420	400	400	460	540	600	500	430	380	250	290	310
Other manufacturing	30	30	10	10	10	10	10	10	10	10	10	10	10
Total nonmanufacturing	1,430	1,980	1,900	1,930	1,940	1,910	1,900	1,960	2,000	1,950	1,900	1,870	1,980
Construction and mining	20	80	70	80	70	50	60	70	70	70	80	70	80
Transportation, communications, & utilities	120	70	70	70	60	60	50	50	50	50	50	50	60
Trade	330	470	490	500	500	490	550	550	550	540	520	510	570
Finance, insurance, and real estate	80	70	50	50	50	50	50	60	50	70	70	70	70
Services and miscellaneous	200	210	200	200	220	230	240	280	320	300	240	240	260
Government	680	1,080	1,010	1,030	1,050	1,030	950	960	980	920	930	930	930

Sector	1970	1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Harney County													
Civilian labor force	3,210	4,120	4,100	4,080	3,650	3,800	3,770	3,550	3,760	3,760	3,990	4,030	3,980
Unemployment	190	900	370	310	360	460	380	400	490	370	300	310	380
Total wage and salary employment	2,150	2,280	2,430	2,440	2,410	2,460	2,440	2,310	2,400	2,570	2,800	2,950	2,780
Total manufacturing	700	350	570	540	480	480	470	310	330	420	550	590	490
Lumber and wood products	700	340	540	520	460	460	450	290	240	210	240	260	210
Other manufacturing	0	10	30	20	20	20	20	20	90	210	310	330	280
Total nonmanufacturing	1,450	1,930	1,860	1,900	1,930	1,980	1,980	2,000	2,070	2,150	2,260	2,360	2,290
Construction and mining	50	160	80	60	50	70	70	80	90	110	120	120	80
Transportation, communications, and utilities	100	90	90	90	90	90	80	90	90	80	80	80	80
Trade	390	510	490	470	470	470	510	510	510	560	570	600	570
Finance, insurance, and real estate	60	70	70	60	50	50	50	60	60	70	60	70	60
Services and miscellaneous	230	250	300	320	330	350	330	340	350	380	410	430	400
Government	620	840	830	900	950	940	930	930	960	960	1,010	1,060	1,090

Source: Oregon Employment Department, various years.

Table 2-42.—Payments-in-Lieu-of-Taxes (\$)

Year	Lake County	Harney County
1990	328,000	328,000
1991	308,000	308,000
1992	308,000	308,000
1993	308,000	308,000
1994	308,000	308,000
1995	295,177	295,177
1996	324,916	324,916
1997	300,180	300,180
1998	297,381	297,381
1999	307,820	307,820
2000	324,916	324,916

Source: "BLM Facts," various years.

cow-calf livestock operations, which sell calves as the primary product, are more common than cow-yearling operations, which sell yearlings as the primary product. In 1998, Lake County ranchers sold an estimated \$20,881,000 worth of cattle and calves or related beef products. Sales in Harney County totaled \$23,018,000 (Oregon State Extension Service 1999). Several Lake County livestock operators feed cattle in feedlots during the winter and early spring; however, these lots are not considered finishing lots, and the majority of cattle are returned to pasture in the spring (Porath, M., *personal communication*).

In conjunction with the livestock industry, growing hay and forage is the second leading agricultural product in both Lake and Harney Counties, with estimated sales of \$16,968,000 and \$10,356,000, respectively, in 1998 (Oregon State Extension Service 1999). The sales figure does not include hay and forage grown by ranching operations to feed their own livestock; thus the total value of hay and forage grown is much higher.

Gross farm sales in Lake County totaled \$41,806,000 in 1998, about 1.3 percent of all agricultural sales in Oregon. Gross farm sales in Harney County totaled \$36,841,000 in 1998, about 1.1 percent of all agricultural sales in Oregon (Oregon State Extension Service 1999). Table 2-39 displays detailed information on gross farm sales by commodity for the State of Oregon and for Lake and Harney Counties since 1990.

The BLM collects grazing fees under two sections of the "Taylor Grazing Act" of 1934. Collections from section 15 leases are distributed as follows: 50 percent to the Range Improvement Fund for appropriation the following year, and 50 percent to the State of Oregon for subsequent distribution to the county of origin.

Collections from section 3 permits are distributed as follows: 50 percent to the Range Improvement Fund for appropriation the following year, 12.5 percent to the State of Oregon for subsequent distribution to the county of origin, and 37.5 percent to the Federal Treasury.

Recreation

Lake and Harney Counties have many beautiful locations for recreation opportunities. The tourism industry is small; however, for people seeking outdoor recreation and solitude, public lands in Lake and Harney Counties have a great deal to offer. A 1997 study prepared for the Oregon Tourism Commission estimated that travel-related spending in Lake County totaled \$11,600,000 in 2000. Of this, an estimated \$2,300,000 was associated with travelers staying in public campgrounds. In Harney County, travel-related spending totaled \$18,000,000, with \$2,800,000 attributed to travelers staying in public campgrounds. Lake County represents just under 2 percent of the \$6.11 billion of travel-related spending in the State of Oregon. Harney County represents 3 percent of total travel expenditures in Oregon (Dean Runyan and Associates 2002). Table 2-44 displays estimated travel expenditures by sector for the State of Oregon and Lake and Harney Counties.

Lake County: There are 40 public campgrounds in the county: 34 are operated by the USFS, 2 by the BLM, 1 by the USFWS at Hart Mountain Refuge, and 2 by the State of Oregon (Lindaman, T., *personal communication*). Seven private campgrounds and RV parks are listed in the yellow pages. Eleven motels and two bed and breakfasts are also listed (CenturyTel of Eastern Oregon, Incorporated 1998).

Table 2-43.—Timber harvest by ownership

Year	Forest industry	Other private	Tribal lands	State	BLM	USFS	Other public	Totals
Lake County								
1984	14,292	273	0	0	0	108,131	0	122,696
1985	52,997	0	0	0	0	138,539	0	191,536
1986	25,562	71	0	0	0	190,092	0	215,725
1987	26,281	994	0	0	0	145,906	0	173,181
1988	13,790	2,029	0	0	0	103,673	0	119,492
1989	55,195	1,806	0	0	0	127,943	2,381	187,325
1990	33,634	2,522	0	6	0	72,600	0	108,762
1991	63,723	2,263	0	0	0	82,273	332	148,591
1992	67,562	14,868	0	0	0	62,983	0	145,413
1993	31,229	14,252	0	0	0	71,185	0	116,666
1994	26,506	5,748	0	0	0	41,789	0	74,043
1995	32,191	9,389	0	0	0	46,780	0	88,360
1996	31,816	3,982	0	0	0	16,890	0	52,688
1997	27,202	4,458	0	0	0	44,078	0	75,738
1998	25,280	1,732	0	0	0	22,930	0	49,942
Harney County								
1984	337	0	0	0	794	68,234	0	69,365
1985	1,807	980	0	0	0	88,495	0	91,282
1986	497	17,345	0	0	0	85,557	0	103,399
1987	410	18,412	0	0	0	91,072	0	109,894
1988	0	100	0	40	0	74,525	0	74,665
1989	14,983	539	0	0	0	62,215	0	77,737
1990	2,253	1,699	0	0	2,413	86,531	0	92,896
1991	1,165	2,474	0	0	1,834	131,995	0	137,468
1992	515	4,041	0	0	0	59,280	0	63,836
1993	0	3,677	0	0	0	42,073	0	45,750
1994	182	4,830	0	0	0	16,785	0	21,797
1995	41	5,335	0	0	300	20,141	0	25,817
1996	840	10,259	0	0	298	11,170	0	22,567
1997	701	1,691	0	0	0	11,116	0	13,508
1998	0	1,130	0	0	78	8,938	0	10,146

Source: State of Oregon, Department of Forestry, various annual reports.

Harney County: There are eight public campgrounds in the county. None of those are located in the RMP area. Two private campgrounds and RV parks are listed in the yellow pages. Thirteen motels and three bed and breakfasts are also listed. None are located within the planning area (CenturyTel of Oregon, Incorporated 1998).

Air Resources

Introduction

Congress passed the “Clean Air Act” (CAA) in 1967 and amended the Act in 1972, 1977, and 1990. This Act gives the State the responsibility for the administration and enforcement of air quality and visibility

Table 2-44.—Travel spending in thousands (\$) and employment generated, 2000

Category	Oregon		Harney County		Lake County	
	Spending	Jobs generated	Spending	Jobs generated	Spending	Jobs generated
Accommodation	986,000	17,300	3,200	70	2,200	40
Eating, drinking	1,286,000	37,800	3,800	150	3,000	90
Food stores	453,000	3,100	2,100	20	2,000	10
Recreation	783,000	18,700	2,000	60	1,300	30
Retail sales	955,000	5,900	3,000	20	2,700	20
Ground transportation	1,015,000	5,400	3,800	20	400	0
Air transportation	591,000	4,300	0	0	0	0
Travel arrangement		2,800		0		0
Totals	6,069,000	95,300	17,900	340	11,600	190

standards. To meet these objectives, the State of Oregon has developed and administered the 2002 “State of Oregon Clean Air Implementation Plan” (Oregon Administrative Rules 340-200-0040). The plan specifies a 22 percent reduction in emission levels statewide from the baseline period of 1982–1984 by the end of year 2001, with a review in 1990 to determine whether “reasonable progress” has been made.

The 1987 “Oregon Smoke Management Plan” (Oregon Administrative Rules 629-043-0043), companion to the 2002 “State of Oregon Clean Air Implementation Plan” (Oregon Administrative Rules 340-200-0040), classifies certain areas as designated areas and smoke sensitive areas. The plan requires that prescribed burning, primarily slash burning, be done only when atmospheric conditions prevent smoke from deteriorating the air quality of these areas. However, the LRA is not included in the “Oregon Smoke Management Plan” but follows a local plan in conjunction with the other members of the South Central Oregon Fire Management Partnership, a proactive voluntary effort to manage smoke emissions.

Existing Conditions

Lakeview and much of northern Nevada are designated PM10 (particles with a diameter of 10 microns or less) nonattainment areas due to high emissions from wood burning in the winter months. This means that within these areas, the air has had concentrations of PM10 in excess of the “National Ambient Air Quality Standard”. Although Lakeview has shown attainment for the past few years, it is still an area of concern and has not been formally redesignated as an attainment area. In 1995, the ODEQ submitted a PM10 control strategy to the Environmental Quality Commission for Lakeview that included revisions to the 1987 “Oregon Smoke Man-

agement Plan” (Oregon Administrative Rules 629-043-0043). The plan includes designating a 20-mile radius special protection zone around Lakeview to help mitigate potential smoke impacts from forest slash and prescribed burning. New air quality standards will regulate the concentrations of PM2.5 (particles with a diameter of 2.5 microns or less).

The South Central Oregon Fire Management Partnership has developed a smoke management plan to help limit smoke impacts into “designated areas” or “smoke sensitive areas.” It was implemented and was effective during the 1999 spring burn season. An average of approximately 100 acres per year were burned from 1980 through 1983. Approximately 3,000 acres per year were burned from 1984 through 1998, and the LRA burned 17,500 acres in 1999. Smoke emissions from prescribed burning activities differ depending on the method used (broadcast burn or pile and burn); the grass, shrub, and tree species burned; the amount of fuel; the proportion of the fuel consumed by the fire; and weather conditions.

There is one nephelometer in the Lakeview area that is operated by the Town Hall for 6 months in the winter and then goes to the Oregon Department of Forestry weather office in Salem for 6 months during the fire season. Additionally, ODEQ is currently monitoring for PM10 and PM2.5 at three locations in Lakeview yearlong. Winter monitoring for PM10 varies from 1 in 3 to 1 in 6 days. PM2.5 is monitored daily in the winter months and 1 in 6 days during the summer. There are no other monitoring stations within the resource area.

In addition to adhering to seasonal and other timing restrictions imposed by the smoke management plan, the BLM reduced emissions from burning through

other means that include performing aggressive fire mop-up, increasing interagency coordination through the South Central Oregon Fire Management Partnership, cutting off or limiting new burning based on current or anticipated smoke accumulation and dispersion, using predictive forecasting to alert the partnership of stable air conditions, which in the past have led to dispersion and intrusion problems, and the monitoring by aircraft to track emissions from prescribed burning.

Fire and Fuels Management

The LRA fire management program focuses on wildland fire and prescribed fire. The wildland fire season generally runs from mid-May through mid-September. Prescribed fires are usually planned for periods before and after the wildland fire season, depending on weather conditions. The LRA averages about 65 wildland fires per year, encompassing approximately 21,000 acres per year (Table 2-45 and Figure 2-1). About 90 percent of the fires that occur are caused by lightning; 10 percent of the fires are caused by humans.

The 1998 “Lakeview District Fire Management Plan” (USDI-BLM 1998e) provides wildland fire management direction for specific geographic areas and outlines preferred suppression actions. The plan describes suppression action constraints (i.e., avoiding use of heavy equipment during initial attack) and defines the numbers of personnel and equipment required for efficient suppression actions (Map FM-1 of the Draft RMP/EIS). The plan also recognizes the natural role of fire in the ecosystem and the risks involved with reintroducing wildland fire.

The 1996 “Fort Rock Area Fire Management Plan” (USDI-BLM 1996g) provides direction for suppressing naturally-occurring fires only within the Fort Rock area. These naturally-occurring fires are monitored on a daily basis, and a suppression matrix is followed that is based on a least-cost-plus loss formula. These fires often extinguish naturally. The typical fire size that occurs in the Fort Rock Fire Management Area is less than one acre. The plan covers 343,000 acres or 10 percent of the total LRA in the northern portion of the LRA. Approximately 30 to 45 lightning ignitions are detected in this area each year. Table 2-46 shows the number of fires by size class for the past 20 years in this area.

The LRA’s prescribed fire program, started in 1981, aims to reduce fuel loadings and restore the natural landscape. From 1981 to 1983, about 100 acres were

burned each year. Since 1984, prescribed burns have averaged about 3,000 acres per year, depending on favorable burning conditions. In fall 1999, one exceptionally large prescribed burn covered more than 15,000 acres. Burns are conducted in sagebrush to reduce hazardous fuel loading, restore typical vegetation conditions to the landscape, and achieve desired vegetation characteristics.

Values at Risk

There are numerous risks involved with fire management activities; these risks are associated with wildland fire exclusion (no fires), with using prescribed fire, and with wildland fire suppression. Rangeland health, wildlife habitat, and air quality are the primary values at risk; grazing is the main commodity use at risk.

Light surface fires, whether prescribed or naturally-ignited, often benefit rangeland health and wildlife habitat. By contrast, high intensity fires may have negative short- and long-term impacts to rangelands and wildlife habitat.

Fire Exclusion

In the “Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin” (USDI-BLM 1996h), it is noted that the subbasins of southcentral Oregon, including Guano, Warner Lakes, Abert, and Summer Lake, have been significantly altered by grazing and fire exclusion. The risks of fire exclusion (no fires), although not immediately visible, become evident as time passes. Risks include habitat conversions from grasslands or shrub steppe to woodlands, and, over time, increased fuel loading. Changes in species and fuel loading alter the historical fire regime. For example, fire exclusion might allow juniper encroachment into sagebrush-steppe ecosystems, whereas periodic fires in sagebrush-steppe ecosystems would kill small juniper trees and allow regeneration of native grasses and forbs. These grasses and forbs would carry subsequent low-intensity fires.

Periodic natural fires have been absent for over a century. This has allowed juniper to spread from less fire-prone sites into sagebrush and riparian communities. The majority of today’s juniper stands within the planning area are composed of trees less than 100 years old.

Prescribed Fire

BLM prescribed fire operations are carefully planned. LRA specialists give considerable thought to all

Table 2-45.—Number of fires by size class on the Lakeview Resource Area (in acres)

Year	0–0.24	0.25–9.9	10–99.9	100–299.9	300–999.9	1000–4999.9	5000 +
1980	48	3	4	0	0	0	0
1981	34	4	2	1	2	1	1
1982	15	7	0	1	0	0	0
1983	18	9	3	2	0	3	3
1984	35	3	10	1	0	6	6
1985	29	9	3	1	3	2	1
1986	54	5	8	5	1	1	3
1987	67	2	7	1	3	1	0
1988	50	3	4	0	0	1	0
1989	18	6	2	0	1	0	0
1990	45	19	1	2	0	0	0
1991	66	4	0	0	0	0	0
1992	159	12	4	1	2	1	0
1993	38	7	0	0	0	0	0
1994	57	7	2	0	0	1	0
1995	37	6	1	2	1	0	0
1996	67	22	4	2	3	0	0
1997	100	7	1	0	0	0	0
1998	30	5	7	0	1	0	0
1999	17	12	2	1	0	2	0
2000	9	4	1	1	0	1	2
Average	47	7	3	1	0.8	1	0.8

Table 2-46.—Total number of fires by size class occurring in the Fort Rock Fire Management Area, 1980–2000

	0–0.24	0.25–9.9	10–99.9	100–299.9	300–999.9	1000–4999.9	5000 +
Number of fires	310	26	8	2	3	3	1

possible effects of the fire. Regardless of the precautions taken, there are risks associated with prescribed fire. These risks include the fire escaping predetermined boundaries, fires burning more intensely than planned, or fires having unanticipated negative effects. For example, fires that exceed the holding capabilities of the operators can escape and burn private property or damage range improvements, such as fences. Prescribed fires may allow noxious weeds to invade a burned site. There are also air quality risks; however, these risks may be mitigated by prescribed burning during weather conditions that allow for good smoke dispersal. In spite of the risks, prescribed burning offsets risks associated with future wildland fires. Recent prescribed fire history is displayed on Map FM-2.

Mechanical, Chemical, and Biological Treatment

Mechanical, chemical, and biological agents are methods that may be used to treat vegetation and reduce fuel loadings. At the current time, mechanical treatment, used mainly in the woodland or timber types for fuels management, is the only one of the three methods used. The vegetation that is treated is determined by BLM resource specialists, so the risk of unwanted treatment area is much lower than with fire (for example, mosaics are easily created). Mechanical treatments that may be commonly used in woodlands/timberlands include chainsawing, shearing, chipping, mowing, etc. Mechanical treatments that may be used in shrublands include plowing, mowing, beating, etc. Opportunities that arise from the development of mechanical equipment may be utilized.

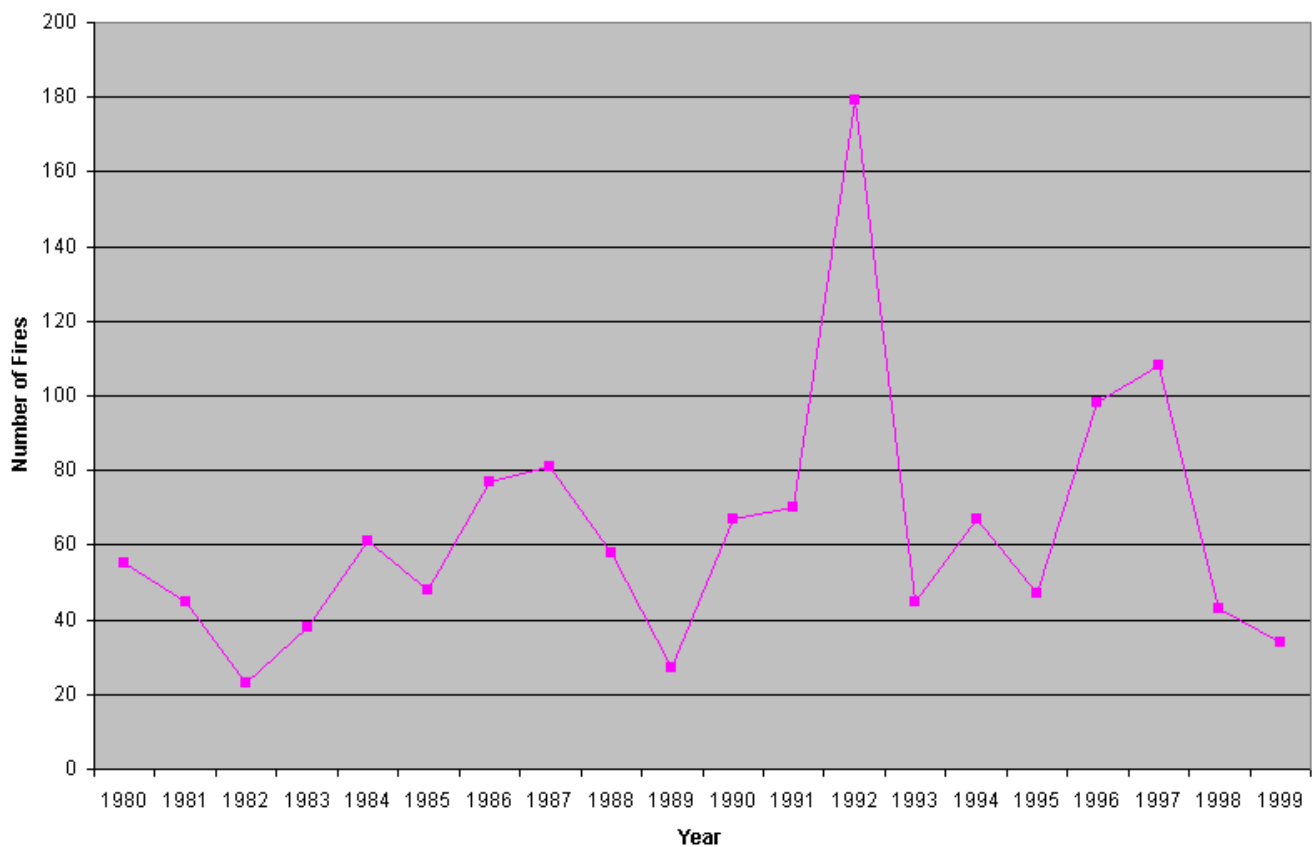


Figure 2-1.—Total number of fires for the Lakeview Resource Area, 1980–1999

Chemical treatment of vegetation to meet resource or fuels reduction objectives is limited to the use of four herbicides at the current time. Oregon BLM is enjoined from selecting herbicides by Federal Court Order #83-6272-E, dated January 6, 1984, and modified by Court Order #844-F2D588 in 1988. Currently, BLM is developing a programmatic EIS for the use of herbicides in the 12 western states. Herbicides also provide the opportunity to apply integrated treatment of vegetation (such as fire/herbicide/seeding or shearing/herbicide/release or seeding). Any use of herbicides would be used in special conditions to meet resource objectives. Tebuthiuron treatments to thin sagebrush stands has shown promise in New Mexico and Utah. This may have application in thinning sagebrush in important greater sage-grouse areas, with more control of the outcome than possible with prescribed fire. Tebuthiuron is not presently approved for use in Oregon.

Biological control for vegetation management would probably be limited to noxious weed control and used as an integrated approach in conjunction with mechanical or fire treatments. This is discussed further in the noxious weed section.

Wildfires

Values at risk from wildland fire depend on the intensity and size of the wildland fire. Suppressing fires in the LRA altogether allows sagebrush and juniper to dominate, which limits grass and forb production. Low-intensity wildland fires may actually improve rangeland health and wildlife habitat. High-intensity wildland fires quickly alter rangelands and wildlife habitat and can produce large amounts of smoke. Domestic livestock may be displaced for several years, and sensitive wildlife species, such as greater sage-grouse, may decline following large wildland fires. While species that favor early successional stages may benefit in the short-term from wildland fires, species that rely on older vegetation will suffer when that vegetation is burned. Severely burned landscapes are more susceptible to noxious weed invasions, furthering declines in rangeland health and wildlife forage. In addition, smoke emissions cause air quality degradation.

Fire also has an effect on recreational and visual resources. Locations where prescribed fires or wildland fires have occurred may become temporarily less

desirable for hikers, campers, or hunters. Impacts on visual resources may vary considerably, depending on the location of the fire. Land-disturbing activities employed in fire suppression may negatively impact the landscape. However, the impact of the fire lessens over time as the landscape becomes revegetated, at which time the area may become more desirable to recreationists. Recent wildland fire history is displayed on Map FM-2.

Appropriate Management Response

Appropriate management response is a set of specific actions taken in response to a wildland fire to implement protection and wildland fire use objectives. These responses can range from full initial attack suppression to monitoring. The appropriate management response for a site-specific area will be documented in the fire management plan. Included in this plan will be a matrix which considers, along with other factors, fire danger, wildland fire use areas, and firefighting resource availability. A wildland fire situation analysis will be done on all fires that exceed initial attack capabilities.

Wildland Fire Use

Wildland fire use is the management of naturally ignited wildland fires to accomplish pre-stated resource management objectives in predefined geographic areas outlined in the fire management plan. A matrix will be outlined in the fire management plan to determine when wildland fire use is meeting resource management objectives or when it becomes wildland fire suppression. If wildland fires have no recognized resource benefits, there is no wildland fire use, only wildland fire suppression using least cost plus loss concepts.

Impacts of Past Management Activities on Fire Hazards

Past management actions have both increased and decreased fire hazards in the LRA. Increased fire hazard is associated with fire exclusion, and decreased fire hazard is associated with prescribed fire practices and allowing the restoration of a more historical vegetative condition. Management practices, such as grazing and reseeding, also affect fire hazard by altering vegetation to make it either more or less flammable.

While implementing prescribed burns and monitoring fires in the Fort Rock area, the LRA has also been

suppressing wildland fires. Without having a detailed and carefully analyzed fire management plan in place for a specific area, current policy requires that all wildland fires be suppressed. Only 10 percent of lands in the LRA are included in a plan that would allow natural fires to burn under certain conditions. These naturally-occurring fires are monitored on a daily basis and a suppression matrix is followed that is based on a least cost plus loss formula. BLM actively suppresses wildland fires as quickly and safely as possible on the other 90 percent of the acres in the LRA.

Fire exclusion and suppression alter vegetation composition and fire regimes. Suppressing fires has allowed sagebrush and juniper to dominate and has resulted in reduced grass and forb production. As juniper invade a site, they eliminate understory vegetation, thus making invaded sites highly resistant to low-intensity fire. Fires occurring in juniper-invaded shrublands may only carry during strong wind conditions, resulting in high-intensity wildland fire. Grazing practices may also reduce grasses and forbs to such an extent that low-intensity fire cannot be sustained. In such degraded rangelands, the lack of fire may further contribute to unwanted shifts in vegetation composition. Prescribed fires are used to reduce the risk of wildland fire. Prescribed burns are planned to reduce fuel loading and enhance native vegetation composition. In some cases, natural vegetative conditions can be restored using prescribed fire.

Cheatgrass is an invasive annual grass that creates a fire hazard in limited parts of the resource area. Cheatgrass thrives in disturbed environments; overgrazing or wildland fires often provide an opportunity for cheatgrass establishment. The species competes with native grasses, forbs, and shrubs, and may be successful at overcoming and outcompeting native vegetation, leaving large expanses of cheatgrass. An area that is overcome by cheatgrass has the tendency to burn more frequently than native shrublands and grasslands. Repeated burning encourages future cheatgrass production at the expense of native grasses, forbs, and shrubs.

Crested wheatgrass is an introduced perennial grass that is sometimes planted by the BLM to revegetate disturbed sites (for example, after a wildland fire). If crested wheatgrass is planted in areas formerly dominated by shrubs, the fire regime may be altered. Crested wheatgrass plantings tend to predominate on the site for long periods of time. Native plants may become codominant over time. Because of its resistance to burning, crested wheatgrass is currently used for developing greenstrips to aid in fire suppression

efforts.

In order to help reduce the risks of wildland fires, BLM regulates the activities of both industrial and nonindustrial use of the public land under its administrative umbrella. One way this is done is through the Industrial Fire Precautions Level System, which regulates permitted industrial operations on the LRA. This system dictates the types of activities (such as chainsaw use) that are acceptable at given fire danger levels. Nonindustrial uses may be managed through regulated closures and management directives for such activities as campfires and vehicles driving on public land. The directives are specific in terms of locations involved and actions prohibited. Such closures and directives are normally issued during periods of high fire danger.

Impacts of Suppression Activities on Other Resources

Building firelines during suppression operations, especially dozer lines, may increase soil erosion, compact the soil, and damage or destroy cultural resources. So that the impacts on resources can be mitigated during initial attack activities, the fire management plan limits the use of heavy equipment on the resource area. However, the noticeable changes to the landscape that result when there are no fires at all may, in fact, indicate an impact to the resources that is more negative than suppression activities. Changes in vegetation, changes in fire regimes, and changes in some wildlife populations are direct and indirect results of fire exclusion.

Fire Ecology of the Major Vegetation Types

Ponderosa pine forests are found in scattered patches throughout the LRA. Most are adjacent to the Fremont National Forest on the western edge of the resource area. The Lost Forest in the northeast section of the resource area is an area of isolated ponderosa pine forest. Studies in southeastern Oregon have shown that prior to 1900 most ponderosa stands experienced low-severity surface fires at intervals ranging from 1 to 30 years (Agee 1993). Because of its thick bark and self-pruning branches, ponderosa pine is fairly resistant to mortality from fire. Today's fire suppression techniques are very successful at quickly controlling ponderosa pine fires while they are still small. However, this suppression in ponderosa pine forests has allowed juniper encroachment and increased surface fuel loadings, which increases the potential for more intense wildland fire behavior.

Juniper woodlands are the most widely distributed forest type in the LRA. Juniper continue to expand their range by encroaching into ponderosa pine forests and shrublands. It is difficult to determine fire histories in juniper. Old growth juniper isolated from other vegetation may not burn for over 300 years. The mountain big sagebrush fire regime (where much juniper has encroached today) typically burned every 15 to 25 years (Miller and Rose 1999). Young western junipers have thin bark and are readily killed by surface fires. Juniper stands with grass and shrub understory will allow fires to carry through the juniper. As trees mature, they outcompete shrub and grass vegetation, leaving little surface vegetation. Such areas are more susceptible to erosion. Older stands become resistant to fire because low site productivity limits fuel availability. Western juniper does not sprout after fire; reestablishment is through seed, which is dispersed fairly slowly by water and animals.

Sagebrush is the most common vegetation type found throughout the LRA. The main sagebrush vegetation types are: big sagebrush (Wyoming and basin) shrub/grassland, low sagebrush shrub/grassland, silver sagebrush shrub/grassland, and mountain big sagebrush shrub/grassland. Wyoming big, basin big, low, and mountain big sagebrush are easily killed by fire and recolonize a site by seeds stored in the soil or by wind dispersal of offsite seeds. Silver sagebrush may regenerate after fire by root sprouting or by offsite seeds. Recovery times of all the sagebrush species greatly depend on the seed availability and moisture following disturbance. Sagebrush fire return intervals are difficult to determine, since fire histories cannot be accurately studied. Sagebrush are typically consumed by fire and do not leave fire scars as evidence that can be used to determine historical fire regimes. However, site productivity affects the fire behavior and frequency in these sagebrush stands. Sites with higher productivity (more grass and forb understory) will carry fire easier and more frequently (10 to 40 years) than sites with low productivity (50 to 150 years). Generally, silver and low sagebrush are found on less productive sites compared to mountain, basin, or Wyoming big sagebrush.

Emergency Fire Rehabilitation

Emergency fire rehabilitation refers to activities that may be completed following wildland fire. Common activities may include seeding with native or nonnative plants, noxious weed control, erosion control, and repairing fences that were burned or building new temporary management fences. Following a wildland fire, specialists decide whether emergency fire rehabili-

tation activities are warranted, based on vegetation condition, soils, fire size and intensity, stream condition, slope, improvements burned by wildland fire, etc. Currently, emergency fire rehabilitation activities are completed after a written and approved emergency fire rehabilitation plan.

Recreation Resources

Introduction

Three major highways and numerous county roads traverse the LRA. This transportation system provides access to a number of roads (both primitive and maintained) on BLM-administered lands. Significant routes within this transportation network include two designated national back country byways and one designated national scenic byway (Map R-1 of the Draft RMP/EIS). Given the considerable means of access, dispersed recreation opportunities exist throughout the entire planning area. Although limited in number, there are opportunities for developed recreation at several sites within the planning area. Adjacent areas of interest managed by other agencies include the Hart Mountain and Sheldon National Antelope Refuges, Steens Mountain, and the Deschutes and Fremont National Forests.

Although the majority of visitors to the LRA are from Oregon, an increasing number are from out-of-state and abroad. BLM attractions featured on recent editions of Oregon Public Broadcasting's "Oregon Field Guide" have further piqued the interest of high desert enthusiasts. There are many and varied opportunities for self-reliant recreational pursuits in the "Oregon Outback."

Current Uses and Facilities

The major recreation activities in the planning area include general sightseeing, driving for pleasure, scenery and wildlife viewing, hiking and backpacking, photography, hunting and fishing, camping, picnicking, hang gliding, rockhounding, caving, and driving OHV's. The heaviest recreation use occurs over Memorial Day and Fourth of July holiday weekends and during fall hunting seasons. There are no fee use areas in the LRA. Commercial recreational use varies year-to-year, but an average of three special recreation permits are issued each year for hunting/guiding activities, one or two are issued for natural history tours, and two to four are issued for adolescent wilderness therapy schools. Administration responsibilities for several of these special recreation permits are

shared with adjacent BLM districts or the Fremont National Forest.

Most recreational use within the LRA is concentrated in two areas—northern Lake County and the Warner Wetlands ACEC/Special Recreation Management Area. The northern Lake County area can generally be described as the portion of the LRA north of Summer Lake and west of Highway 395. Recreation sites and facilities in this area that are regularly patrolled by BLM personnel include the Black Hills, Duncan Reservoir Campground, Buck Creek Watchable Wildlife Site, West Fork Silver Creek, Green Mountain Camp, Crack-in-the-Ground, Derrick Cave, Fossil Lake, Christmas Valley Sand Dunes, and the Lost Forest (Map R-1 of the Draft RMP/EIS). All of these sites are located on or near the Christmas Valley National Back Country Byway and are within or adjacent to four WSA's and a RNA. The heaviest recreational use occurs during the summer months, but the area is heavily hunted in the fall and early winter months as well.

One high-use area is the Sand Dunes, an area open to OHV and all-terrain vehicle use. During Memorial Day weekend, more than 1,000 OHV enthusiasts crowd into the area. Visitor use in northern Lake County has increased in recent years and has paralleled the increase in population which has been occurring in Bend, Oregon, approximately 80 miles away.

Since its establishment as an ACEC in 1989, recreational use and interest in the Warner Wetlands have also been on the rise. Located along the Lakeview to Steens National Back Country Byway, and adjacent to the Hart Mountain National Antelope Refuge, interpretive facilities at Hart Bar and the Warner Valley Overlook orient and educate visitors to the area. Until recently, use of these sites has been a by-product of recreational visits to Hart Mountain Refuge (estimated at 20,000). As water levels have increased at the Warner Wetlands (1999 was historically high), visitor numbers to the wetlands as a destination point have risen steadily. During these high water years, fishing, waterfowl hunting, canoeing, sea kayaking, and bird watching are popular recreation activities in the Warner Wetlands ACEC.

Other attractions and facilities in the resource area include the following:

- The Sunstone Collection Area is a 4 square-mile area open to public collection of sunstones for personal use.

- Highway Well Rest Area, located 55 miles north of Lakeview on U.S. Highway 395, is cooperatively managed by the State of Oregon and BLM. Recently reconstructed, it provides travelers with vault toilets, drinking water, picnic tables under a shade structure, and several interpretive signs.
- Abert Lake Watchable Wildlife Site is a small interpretive site located along Abert Lake on U.S. Highway 395 about 25 miles north of Lakeview.
- A short stretch of the Chewaucan River above the town of Paisley flows through intermingled public lands (BLM and USFS). This area is monitored by the Paisley District of the Fremont National Forest through an informal agreement.
- The Doherty Slide Hang Gliding Launch Site, located 60 miles east of Lakeview, adds to Lakeview's title of "Hang Gliding Capital of the West."

Fishing opportunities are available throughout the planning area in numerous lakes, reservoirs, and streams. The ODFW stocks rainbow trout in the following waters: Mud Lake, Spaulding, Lucky, Sunstone, West Sunstone, Duncan, Sherlock, Sid Luce, Big Rock, and MC Reservoirs. In the Warner Wetlands, crappie, largemouth bass, and bullhead catfish may be caught during high water years.

Hunting for big game (pronghorn, bighorn sheep, mule deer, and elk), as well as for waterfowl, upland game birds, and small game such as rabbits and coyotes, occurs throughout the planning area, mainly during fall and early winter.

BLM has developed recreational brochures for several of the more visited or sensitive areas, and these have been made available at numerous businesses and agency offices. Brochures are available for the Lakeview to Steens and Christmas Valley National Back Country Byways, the Sunstone Collection Area, the Lost Forest RNA, and the Christmas Valley Sand Dunes. Handouts for the Warner Wetlands have been developed showing the road system and a marked canoe trail. Two recreation maps showing major roads and recreational opportunities cover the entire LRA and are available for sale.

Locations of these sites are shown in Map R-1 of the Draft RMP/EIS. Estimated use figures derived from traffic counter data and field observations are shown in Table 2-47.

Recreational Fee Demonstration Program

BLM currently has authority to charge and collect fees through two separate programs related to the "Land and Water Conservation Fund Act" and other laws.

The "Omnibus Budget Reconciliation Act" of 1993 (Public Law 103-66) amended the "Land and Water Conservation Fund Act" and further expanded the BLM's authority to collect recreation use fees and deposit these fees into special accounts. Up to 15 percent of the fees collected are available for immediate use at the sites where the fees were collected, and the remainder of the fees collected may be appropriated to the area where they were collected in the following fiscal year.

The 1996 appropriations process (Public Law 104-134) again amended the "Land and Water Conservation Fund Act" by establishing criteria for the Pilot Fee Demonstration Program (Fee Demo) for four agencies, including the BLM, National Park Service, USFS, and USFWS. The focus of this pilot program was to test the collection, retention, and reinvestment of new admission and user fees. The funds collected would be spent for backlog repair and maintenance projects, interpretation, signs, habitat and facility enhancement, resource preservation, annual operations, maintenance, and law enforcement relating to public use. A key component of the Fee Demo program is that all fees collected are available for immediate use in the year that they are collected.

By the end of fiscal year 2002 (September 30, 2002), the BLM will collect all recreation-related fees under the authority of the Fee Demo program and will phase out the collection of fees under the "Land and Water Conservation Fund Act." There are currently no developed recreation sites within the LRA that require fee payment. However, collections at developed recreation sites could be considered in the future. Revenues associated with permitted uses, such as commercial special recreation permits, competitive events, organized groups, and special area uses, will be collected under the Fee Demo program authority. Fees collected would be used to improve recreation facilities and to monitor activities permitted under special recreation permits.

Special Recreation Management Areas

All BLM-administered land falls into two recreation management classes: special recreation management areas or extensive recreation management areas. A relatively small portion of the LRA is managed as

Table 2-47.—Visitation ¹

Name	Annual visits	Amenities and other data
Abert Lake Watchable Wildlife Site	<u>6,000</u>	Graveled pulloff on Highway 395 and three interpretive signs; located within Lake Abert ACEC.
Doherty Slide Hang Gliding Launch	400	Access road, graveled launch pad, register box; located on Highway 140.
Highway Well Rest Area	70,000	Two vault toilets, drinking water, trash cans, picnic shelter, interpretive signs; located on Highway 395.
Sunstone Collection Area	4,000	Vault toilet, an interpretive sign.
Buck Creek Watchable Wildlife Site	600	Access road, parking area, picnic table, interpretive signs.
Crack-in-the-Ground	7,500	Vault toilet, fenced parking area, foot trail, register box; located within the Four Craters WSA and along a national back country byway.
Derrick Cave	2,800	Register box; located on “way” within the Devils Garden WSA.
Green Mountain Camp	800	Three picnic tables on graveled sites; located along a national back country byway.
Duncan Reservoir Campground	5,000	Vault toilet, four picnic tables on graveled sites, one group site, boat launch, and register box; stocked annually by ODFW; the only developed campground in the LRA.
Lost Forest/Sand Dunes/Fossil Lake ACEC	11,000	Bulletin board, interpretive signs, register box, wood barrier fences; includes the Sand Dunes WSA, Lost Forest RNA, and Fossil Lake Vehicle Closure; located along a national back country byway.
Warner Wetlands	<u>8,000</u>	
Hart Bar		Two vault toilets, parking area, four interpretive signs, two viewing blinds on 1-mile mowed dike; located in the Warner Wetlands ACEC and along a national back country byway.
Warner Valley Overlook		Graveled parking area, 0.25-mile trail, four interpretive signs; located along a national back country byway and adjacent to Hart Mountain National Antelope Refuge.
Remainder of resource area	<u>5,000</u>	Numerous hunting and dispersed recreation opportunities.

¹ Visitation estimates are derived from traffic counters, registration boxes, correspondence with adjacent agencies, and professional judgement.

special recreation management areas. Major investments in recreation facilities and visitor assistance are appropriate in special recreation management areas when required to meet management objectives. Primary management objectives within special recreation management areas are providing recreation opportunities that would not otherwise be available to the public, reducing conflict among users, minimizing damage to resources, and reducing visitor health and safety problems. These areas are described in the following sections and are shown on Map R-1 of the Draft RMP/

EIS.

Existing Special Recreation Management Areas

Warner Wetlands Special Recreation Management Area: The Warner Wetlands Special Recreation Management Area has the same size, configuration, and boundaries as the Warner Wetlands ACEC. Located approximately 50 miles northeast of Lakeview, the current recreation management of the wetlands is to provide for activities and facilities which compliment,

or are consistent with, the wildlife, vegetation, and cultural resource management objectives of the ACEC. Facilities in the special recreation management area consist of Hart Bar Interpretive Site, Warner Valley Overlook, and a 10-mile canoe trail marked in the channels between Campbell, Turpin, and Stone Corral Lakes. The "Recreation Area Management Plan" (USDI-BLM 1990i) discussed constructing additional facilities (trails, campgrounds, and overlooks), but these have not been constructed because of potential impacts to cultural resources and wildlife habitat. Since USFWS recently acquired lands within the ACEC, there are tentative plans for a joint BLM/USFWS campground to be constructed on that property. The LRA has an informal agreement with USFWS, where USFWS is responsible for the maintenance of the Warner Valley Overlook site. The Lakeview to Steens National Back Country Byway takes the visitor past Hart Bar and Warner Valley Overlook and onto the Hart Mountain National Antelope to connect with the Steens Mountain National Back Country Byway.

The type and amount of recreational use in the Warner Wetlands away from the back country byway fluctuates with the water levels. During high water years when the lakes and channels fill, activities such as boating, fishing, waterfowl hunting, canoeing, and kayaking are possible. Currently, there are no restrictions on motorboat use. During dry years, these water-based opportunities are not available and use is more vehicle oriented. During dry years, illegal artifact collecting becomes a major problem, as does cross-country vehicle travel. The OHV designation for the special recreation management area is limited to designated roads and trails, but the recreation area management plan does not specifically designate any roads or trails open or closed. However, an informal inventory of the road system has since been conducted, and most of the roads and trails have been designated as open. During high water years, portions of almost all of these roads are under water and impassable, sometimes for several years. Use of the special recreation management area is estimated at 8,000 visitors a year, mostly associated with Hart Bar.

Proposed Special Recreation Management Areas

North Lake County: This area consists of the more highly visited areas along the Christmas Valley Back Country Byway, including four WSA's (Devils Garden, Squaw Ridge, Four Craters, and Sand Dunes), the Lost Forest/Sand Dunes/Fossil Lake ACEC, and the associated geologic features in the area (Black Hills, Crack-in-the-Ground, Derrick Cave, Sand Dunes, Lost Forest,

and Fossil Lake). All the LRA's seven significant caves are also within this area, along with Duncan Reservoir Campground, West Fork Silver Creek, and Buck Creek.

Recreational use in northern Lake County has steadily increased over the past 10 years. Since 1994, the LRA has hired a seasonal employee to patrol north Lake County from April through November. This position is primarily funded through an Oregon State Parks and Recreation OHV grant. Currently, there are limited facilities at the various sites, and OHV designations range from open to limited to closed. Although the Sand Dunes are within a WSA, they have remained open to crosscountry vehicle use since this use was occurring prior to the area being designated a WSA. Many OHV enthusiasts come from throughout central Oregon to recreate in these dunes because the dunes along the Oregon coast have become crowded and restrictive. OHV use violations occur regularly at the Sand Dunes because the surrounding area is either limited to designated roads and trails or closed completely.

Over the last few years, recreational use during the winter season in northern Lake County has steadily increased. The winter rains and snow and the increased visitation during the winter season have resulted in increased damage to roads. Management issues in this area include OHV use, vandalism, firewood collection in the Lost Forest, commercial uses (e.g., wilderness therapy schools), and increasing visitor pressure in general.

Extensive Recreation Management Areas

In the extensive recreation management areas, management actions to facilitate recreation opportunities are limited primarily to providing basic information and access. People visiting extensive recreation management areas are expected to rely heavily on their own equipment, knowledge, and skills while participating in recreation activities.

The Lakeview Resource Area: The majority of the lands within the LRA are managed as an extensive recreation management area. In fact, recreation activities and facilities in the extensive recreation management area currently include everything in the LRA except the Warner Wetlands Special Recreation Management Area. All of the WSA's and developed sites (except those associated with the wetlands) are included in the current extensive recreation management area, as are numerous small reservoirs and lakes which are stocked by the ODFW. Several creeks also

provide fishing opportunities for rainbow trout. Except for the few facilities in northern Lake County, most of the recreational use is dispersed and occurs primarily during the fall hunting seasons for pronghorn, deer, and elk. ODFW issued approximately 7,500 big game tags (pronghorn, bighorn sheep, mule deer, and elk) in 1999 for hunt units located in the planning area.

Recreation Opportunity Spectrum

The recreation opportunity spectrum recognizes that people want and need different recreation experiences, and that the resource base has a varying potential for providing recreation experiences. Through recreation opportunity spectrum, management can characterize demand for various types of recreation settings and opportunities, and the capability of the resource to provide such experiences. All possible combinations of recreation experiences, settings, and activity opportunities can be arranged along a spectrum, or continuum. The recreation opportunity spectrum is divided into six classes: primitive, semiprimitive nonmotorized, semiprimitive motorized, roaded natural, rural, and modern urban. Each class is defined in terms of a combination of activity, setting, and experience opportunities (see Appendix M2 and Map R-3 of the Draft RMP/EIS).

Recreation opportunity spectrum classes are established as the result of an inventory and are used as an analysis tool in the RMP process. Currently, the LRA has not been inventoried for recreation opportunity spectrum. However, recreation opportunity spectrum could be a tool to be used in developing OHV designations and setting limits for special recreation permits.

Special Recreation Permits

Special recreation permits are authorizations that allow for recreational use of the public lands and related waters. They are issued as a means to manage visitor use, protect natural and cultural resources, provide for the health and safety of visitors, and provide a mechanism to accommodate commercial recreational uses. There are four types of uses for which these permits are required: commercial, competitive, organized groups/events, and individual or group use in special areas.

The LRA authorizes approximately five to eight special recreation permits every year, including two or three permits which are shared with and administered by adjacent BLM and USFS offices. Where possible, commercial operations which cross district or forest lines are administered under one permit in order to provide "one-stop shopping" for the customer. Cur-

rently, the LRA administers one hunting/guiding permit and two wilderness therapy school permits (in conjunction with two other districts). Administration of four additional shared hunting/guiding permits is through the Prineville, Burns, and Vale BLM Districts, and the Fremont National Forest. In addition, LRA staff are aware of commercial and educational tours taking place without proper authorization.

The main workload for permits concerns the wilderness therapy schools. These schools are designed to benefit adolescents aged 13–18 who are experiencing problems such as substance abuse, depression, oppositional and defiant behavior, and emotional problems. Generally, students are supervised in a remote, nomadic camp setting while learning basic survival skills. The programs are designed to remove the student from their familiar settings and enable them to learn to accept accountability for their actions in an unfamiliar, harsh environment.

One school operates in northern Lake County and southern Deschutes County; another group operates in eastern Lake County and portions of western Harney County. The four schools, Catherine Freer, TREX, Sage Walk, and Obsidian, have been under permit since 1988, 1996, 1997, and 1998, respectively. Table 2-48 shows the number of students attending these schools since 1988.

Due to the rapid increase in students, particularly in northern Lake County where three of the groups operate, conflicts have occurred concerning public safety, road conditions, runaways, wildlife, and use of resources. Incidents in 1999 and 2000 led to BLM instituting a moratorium on these schools, which prohibits any new schools from operating in the LRA and limits the number of students participating in each school.

As visitor use in a recreation area increases, one of the actions that may be taken by the authorized officer is to determine the desired level of use or carrying capacity. If the use level in the area exceeds the carrying capacity, measures would be taken to remedy the problem. Actions could include limiting the overall number of individuals, the number of groups or parties, or the number of individuals per group.

Off-Highway Vehicle Designations

The "National Management Strategy for Motorized

Table 2-48.—Number of students annually in each school

Year	Catherine Freer	TREX	Sage Walk	Obsidian	Total
1989	9				9
1990	13				13
1991	18				18
1992	4				4
1993	41				41
1994	11				11
1995	24				24
1996	30				30
1997	89	63	20		172
1998	78	65	31		174
1999	135	40	50	39	264

Off-Highway Vehicle Use on Public Lands” (USDI-BLM 2001e) is a comprehensive effort for developing a proactive approach to determine and implement better on-the-ground motorized OHV management solutions designed to conserve soil, wildlife, water quality, native vegetation, air quality, heritage resources, and other resources while providing for appropriate motorized recreational opportunities. The strategy provides agency guidance and offers recommendations for future actions to improve motorized vehicle management. The implementation of this strategy will be an ongoing, adaptive process that will require the continued participation of interested public. As a guiding document, the strategy will be refined and implemented as opportunities arise and funding allows. The strategy will help ensure consistent and positive management of environmentally responsible motorized OHV use on public lands.

OHV use is frequently associated with hunting, fishing, and driving for pleasure, and also occurs for administrative purposes such as livestock management and facility management.

All public land in the planning area is designated as open, limited, or closed in regard to vehicle use. In an open area, all types of vehicle use are permitted at all times. In a limited area, vehicle use is restricted at certain times, in certain areas, to designated routes, to existing routes, or to certain vehicular uses. In a closed area, motorized vehicle use is prohibited. Appendix M1 of the Draft RMP/EIS provides further definition of OHV use terms.

The majority of the LRA (2,510,908 acres) is designated as open to vehicular travel. Through various planning amendments and emergency vehicle closures, several areas have been designated as closed or limited

and are shown in Table 2-49 and Map R-2 of the Draft RMP/EIS.

Most of the motorized vehicular use occurs on existing roads and unmaintained “jeep trails.” However, off-road (cross-country) vehicle use also occurs in intensive use areas, such as the Sand Dunes, and on isolated tracks dispersed through the planning area. On- and off-road vehicle use occurs within special management areas (SMA’s) and critical or important wildlife habitats, cultural sites, and plant sites. Some of this use is inappropriate or damaging to these special/sensitive areas and resource values.

Visual Resources

Introduction

Visual resources are the land, water, vegetation, structures, and other features that make up the scenery of BLM-administered lands. BLM-administered lands are classified according to their relative worth from a visual resource management (VRM) point of view.

Three factors are considered in developing VRM objectives. These factors are the inherent scenic quality of the landscape, the visual sensitivity the public has for the landscape, and the visual distance (whether the landscape can be seen as foreground, middleground, background, or is seldom seen from a travel route or sensitivity area). Examples of highly scenic areas include Abert Rim, and Deep Creek, Camas Creek, and Twentymile Creek Canyons. Public lands seen from Highway 140, Highway Well Rest Area, or along a national back country byway are examples of lands highly sensitive to landscape modification.

Table 2-49.—Off-highway vehicle designations under current management

Designation	Area	Acres
Limited to existing roads and trails	Wilderness study areas	461,310
	Lake Abert ACEC	50,117
	Alkali Lake Dunes	6,813
	Picture Rock Pass	491
	Juniper Mountain	2,500
Limited to designated roads and trails	Warner Wetlands ACEC	53,087
	Lost Forest RNA	9,047
Closed	Black Hills	1,729
	Crane Mountain	1,057
	Fossil Lake	6,660
	Table Rock	57
	Westside Gravel Pit	81
	Cougar Mountain	44
	Buck Creek Watchable Wildlife Site	590
	South Green Mountain	14
Closed seasonally (12/1–3/31)	Cabin Lake/Silver Lake Deer Winter Range (Silver Lake and Fort Rock area)	66,460
Open	Remainder of LRA (including Sand Dunes WSA)	2,508,408

Scenic quality, sensitivity levels, and distance zones are combined to determine the VRM classes for the area. VRM classes specify management objectives and allow for differing degrees of modification in the basic elements of landscape features (form, line, color, and texture). See Appendix M3 of the Draft RMP/EIS for a detailed description of VRM classification.

Visual management classes are established through the RMP process for all BLM-administered lands. During the RMP process, the class boundaries are adjusted as necessary to reflect resource allocation decisions made in the RMP. Management objectives for each class are designed to mitigate, and in some cases avoid, the adverse effect of management activities on scenic values.

To help maintain the management objectives of a VRM class, the BLM's visual contrast rating system is used for proposed projects and activities to help analyze and mitigate visual impacts to the existing landscape. This systematic process uses the basic design elements of form, line, color, and texture to compare the proposed

project/activity with the major features of the existing landscape.

Current Management Classes

Visual management classes in the LRA are compiled from several planning efforts, which took place between 1982 and 1999, as well as new BLM guidance. Unfortunately, detailed records regarding some of this inventory data have been lost and are no longer available. Map VRM-1 of the Draft RMP/EIS shows VRM classes derived from these inventories, as well as updated state and national guidance. Acreages, percentages of the land base, and representative areas in each class are listed in Table 2-50.

Geology and Minerals

Introduction

Past mineral activity in the LRA has included explora-

tion for and production of sand, gravel, rock, cinders, decorative stone, sunstones, and diatomite. Minor amounts of perlite, mercury, gold, lead, dolomitic limestone, and zinc have been produced from scattered sources. Currently, the principal mineral activities in the resource area are the production of gravel and rock for the maintenance of county roads and state highways, and the mining of sunstones, perlite, and diatomite.

It is also anticipated that the demand for mineral material, such as sand and gravel for road construction and maintenance, will increase. The demand for decorative stone is expected to increase significantly. These scattered perlite deposits in the LRA are associated with rhyolitic rocks, dacitic rocks, and metals that have been deposited at shallow depths associated with volcanism phenomenon, such as hydrothermal waters.

The “National Energy Policy” of 2001 states that the electricity demand is projected to expand rapidly over the next 20 years. As a result, this policy recommends that public lands remain open for energy and development.

There are three designated known geothermal resource areas within the planning area. Most of the planning area has potential for geothermal energy, as indicated by high heat flow. In addition to high heat flow, the Summer Lake/Paisley, south Warner Valley, and Lakeview areas contain hot springs and hot wells. Currently, geothermal energy is used only for heating homes, businesses, and greenhouses in the Lakeview area, and for mineral baths in the Lakeview and Summer Lake areas. Furthermore, with anticipated energy shortages in the Pacific Northwest and California, and the focus on global warming, the clean geothermal, solar, and wind energy resources that are present on the LRA could become more important in the future. California’s electricity crisis may continue or increase, allowing interest in new markets and neighboring states for electricity. Since the LRA is located next to northern California, electricity may be generated from the geothermal, solar, and wind resources to supply the surrounding communities and California in the future.

Presently there are no exploration or plans for solar or wind development on the LRA. In 2001, interest in wind energy development was expressed but not pursued.

Appendix N1 of the Draft RMP/EIS has more complete information on historical mining and mineral activity; Table 2-51 gives a summary of the current mining

activity.

Current Activity

Locatable Minerals

As of September 1999, there were 368 mining claims recorded in the resource area. A total of 295 of these claims are in the Rabbit Basin sunstone area. The remaining claims are in the Tucker Hill perlite area and Christmas Valley diatomite area. Except for sunstone exploration and minor exploration associated with the Christmas Valley diatomite operation, there is no known ongoing locatable mineral exploration. There are no known deposits of critical or strategic minerals located in the resource area. Existing locatable mineral potential is displayed on Map M-4 of the Draft RMP/EIS and Table 2-50a.

Table 2-51 displays the acres of land where mining is currently restricted or not allowed. Less than 1 percent of the LRA is segregated from mining under the mining laws. This percentage does not include withdrawals where BLM does not have surface management. Including those withdrawals, approximately 10 percent of the Federal land within the boundaries of the LRA is closed to mining. About 2,500 acres in the Rabbit Basin sunstone area are classified closed to mining claim location under the “Classification and Multiple Use Act” of 1964. Mining on approximately 466,864 acres of WSA’s is restricted in that any work on mining claims located after October 21, 1976, must not impair wilderness values, as required by wilderness IMP (UDSI-BLM 1995b). Mining plans of operation are required on lands under wilderness study and on approximately 110,300 additional acres of designated ACEC’s, regardless of the size of the acreage to be disturbed. Table 2-51 and Map M-3 of the Draft RMP/EIS display the withdrawals mentioned above, and other restrictions.

Currently, there are no explorations or claims for uranium existing in the LRA. Areas of low potential for uranium are displayed on Map M-4 of the Draft RMP/EIS. No commercial development of uranium has occurred in the LRA, but uranium was mined in the adjacent Fremont National Forest in the 1950s and 1960s. Concerns about safety of nuclear energy, high cost, surplus, and disposal of radioactive waste has limited the demand for uranium ore.

Even so, as demand for energy increases, nuclear energy may become popular, and the LRA may be explored for uranium deposits. Since the LRA has a low potential uranium deposit with a level of C cer-

Table 2-50.—Visual resource management classes

VRM class	Acres	Percent- age of BLM land base	Representative BLM areas
I	493,890	16	Wilderness study areas, research natural areas, Abert Rim corridor.
II	141,429	4	Deep, Twentymile, and Twelvemile Creeks, Fish Creek Rim, Table Rock
III	29,778	9	Warner Wetlands ACEC, Highways 140 and 31 corridors, Lake Abert ACEC
IV	2,235,745	71	Seldom seen areas of low visual quality and low sensitivity.

Sources: "Lakeview Grazing Management EIS" (USDI-BLM 1982a); "High Desert Management Framework Plan Amendment" (USDI-BLM 1996d); and "Oregon Wilderness EIS" (USDI-BLM 1989a).

Table 2-50a.—Acreage for all locatable mineral potential¹

Mineral and potential for occurrence	Acres
Base and precious metals	
High	3,512
Medium	186,026
Low or unknown	3,049,272
Diatomite	
High	31,377
Medium	269,522
Low or unknown	2,937,911
Dolomitic limestone	
High	784
Uranium	
Low	7,087
Unknown	3,231,723
Sunstones	
High	6,252
Perlite	
High	1,367
Medium	3,345
Low or unknown	3,234,098

¹ Includes all Federal and non-Federal mineral ownerships within the planning area boundary. Approximately 25,245 acres of high potential and 268,224 acres of moderate potential exist under Federal mineral ownership within the planning area.

tainty (the available data provide direct evidence but are quantitatively minimal to support or refute the possible existence of mineral resources) and lies mostly within the Hawk Mountain WSA, uranium development is not expected unless Congress designates the Hawk Mountain WSA as nonwilderness.

Leasable Minerals

No exploration permits or leases exist in the resource area, and no lands are withdrawn from mineral leasing. However, about 423,300 acres in WSA's are closed to mineral leasing by BLM policy (USDI-BLM 1995b), unless released by Congress. The only use of leasable-type minerals in the planning area is on private land

Table 2-51.—Mineral statistics for the Lakeview Resource Area

Category	Acres (unless otherwise noted)
BLM surface and mineral estate	3,043,900
Reserved mineral estate—no surface, all minerals	113,900
Reserved mineral estate—no surface, partial minerals	7,110
Reserved mineral estate—all surface, partial minerals	700
Acquired minerals—Bankhead-Jones lands ¹ (estimated)	73,200
Community pits (#)	0
Free use permits (#)	16
Material site right-of-way-pits/quarries (#)	19
Material site right-of-way storage sites (#)	14
Mining claims (#)	368
43 CFR 3809 mining/exploration notices (#)	27
43 CFR 3809 mining/exploration plans (#)	2
43 CFR 3802 mining/exploration plans (#)	0
43 CFR 3715 occupancies (#)	15
Known geothermal resource areas	
Number	3
Total acres	111,500
Public land acres	50,400
Geothermal leases (# and acres)	0
43 CFR 3209 exploration notices	0
Oil and gas leases (# and acres)	0
43 CFR 3151 geophysical notices (#)	0
Other mineral leases, permits	0
Withdrawals (BLM)	
Leasable and locatable	0
Locatable only	16,200
Nonmetalliferous mining only	1,900
Withdrawals (other agency) ²	
Leasable and locatable	0
Locatable only	272,000
Wilderness study segregations (leasable/salable)	423,300
C&MU Act segregation (locatable only)	2,500

¹ Bankhead-Jones lands are lands that went to private ownership but later reverted back to the government.

² The BLM does not have surface management jurisdiction on these lands, so they are not officially covered by this land use plan. However, the lands represent significant Federal acres within the planning area that are closed to mining. The BLM has mineral leasing responsibility on these lands, none of which are included in subsequent tables.

where geothermal energy is being used for bathing (Paisley and Lakeview areas) and for greenhouse, business, and home heating (Lakeview). Map M-5 of the Draft RMP/EIS and Table 2-52 shows leasable mineral potential in the planning area.

A total of about 1,373,123 acres of the public land mineral estate are open to geothermal, oil, and gas leasing, subject to standard lease stipulations. About 759,214 acres are open to leasing subject to moderately restrictive stipulations, such as seasonal, OHV, and

visual resource restrictions. Approximately 612,776 acres of the mineral estate are subject to a no-surface-occupancy stipulation.

Currently, oil and gas and geothermal leasing is covered by “Oil and Gas/Geothermal Leasing Environmental Assessments” (USDI-BLM undated c, 1981c).

Presently, there are no exploration or leases for coal, coal bed methane, oil shale, or tar sands existing in the LRA. The LRA has low potential for these resources.

Table 2-52.—Acres for all leasable mineral potential ¹

Mineral and potential for occurrence	Acres
Geothermal resources	
High	114,073
Medium	2,327,341
Low	1,784,565
Lakebed evaporites	
High	107,871
Medium	254,994
Low	639,689
Oil and gas	
Medium	2,631,475
Low	1,594,505

¹ Includes all Federal and non-Federal mineral ownerships within the planning area boundary. Approximately 114,309 acres of high potential and 2,708,184 acres of moderate potential exist under Federal mineral ownership within the planning area.

Therefore, as required by 43 CFR 3461, the LRA is considered unacceptable for further consideration for coal, coal bed methane, oil shale, or tar sands development at this time. Leasable mineral potential is described in Appendix N-1 of the Draft RMP/EIS.

Salable Minerals

There are an estimated 50 to 100 sand and gravel, rock, and cinder pits on public land in the resource area (Map M-3 of the Draft RMP/EIS). Table 2-53 summarizes salable mineral potential acreage. Most of this material is used for construction and maintenance of roads and highways. Lake County and the State of Oregon hold 16 free-use permits, and the State also has 19 pits or quarries and 14 additional storage sites authorized under mineral material site rights-of-way (Table 2-51). Sale of mineral materials to individuals averages about 15–20 sales per year, but is increasing. Sources for decorative stone are scattered across the LRA. The best source of decorative stone is located in the Devils Garden WSA.

Designated WSA's are closed to saleable mineral disposal by BLM policy (USDI-BLM 1995b). Any WSA or portions thereof that are not designated by Congress as wilderness would be opened to mineral material disposal (unless closed by other management actions).

The restrictions on mineral material disposal are generally the same as those for leasing, and are displayed on Table 3-7. See Appendix N-1 of the Draft RMP/EIS for a discussion of salable mineral potential.

Renewable Energy Resources

The LRA has received inquiries regarding areas with the potential for wind farm development. Areas such as Christmas Valley, Coyote and Rabbit Hills, and South Warner Rim may have potential. Currently, the Oregon Office of Energy holds a wind monitoring site right-of-way on South Warner Rim. Studies by TrueWind Solutions indicate that the LRA wind power potential ranges from -1 to 6 classes, with -1 being very low potential and 6 being high potential. Although the LRA does not have any specific areas identified for development at the present time, future proposals would be considered.

The LRA may have some potential for the development of solar energy. The U.S. Department of Energy's National Renewable Energy Laboratory indicates the LRA receives moderate to moderately-high solar radiation (http://www.nrel.gov/gis/solar_maps.html). To date, the LRA has not received any inquiries regarding the development of solar energy. Any future inquiries would be considered.

Restrictions to Mineral Exploration, Development, and Production

Generally, BLM-administered land is open to mineral exploration and development under multiple use management principles. However, there are two types of closures that can restrict these activities: discretionary and nondiscretionary.

Table 2-53.—Acreage for salable mineral potential

Mineral and potential or occurrence	Acres
Cinders	
High	1,128
Unknown	3,237,682
Decorative Stone	
High	42,458
Medium	320
Unknown	3,196,032
Quarry Rock	
High	331
Unknown	3,238,479
Sand/Gravel	
High	1,220
Medium	852
Low or unknown	3,236,738

Discretionary closures are determined through BLM's resource management planning process. These closures usually involve lands where the resource values are considered so significant that they outweigh any economic return that can be expected from mineral development or the environmental impacts resulting from mineral operations could irreparably damage those resources. Less restrictive stipulations or conditions were considered, but were inadequate to protect resource values contained in those parcels.

Nondiscretionary closures are areas specifically closed to energy and/or mineral leasing, entry, or material disposal, by law, regulation, or Executive order. Examples include BLM and other agency withdrawals. The BLM must petition the Secretary of the Interior to withdraw public lands. Withdrawals of 5,000 acres or more require congressional notification. Nondiscretionary closures in the LRA include public water reserves (see Map M-2 of the Draft RMP/EIS).

Designations such as RNA's and ACEC's, and presence of cultural resources, sensitive species, visual resources, and deer winter range may constrain mineral exploration or development.

Table 2-51 and Map M-2 of the Draft RMP/EIS displays existing withdrawals, WSA's, recreation and public purposes, and other segregations that restrict mineral activities in the resource area. Table 2-51

shows acres of mineral estate that are open, closed, or otherwise restricted for the three classes of minerals.

Lands and Realty

Lands

Existing Conditions

Land Ownership

The LRA administers public lands in Lake and Harney Counties. The LRA encompasses approximately 2,414,336 acres in Lake County, 744,907 in Harney County, and 2,172 acres in Washoe County. About 56 percent of Lake County and about 91 percent of Harney County within the boundaries of the resource area are public land administered by the LRA (BLM files). Table 1-1 shows land ownership and administration in Lake, Harney, and Washoe Counties that exist within the boundaries of the LRA.

The LRA administers lands predominately located in high desert terrain east and west of U.S. Highway 395 (Map I-1). The majority of the public lands are public domain lands (3,080,383 acres), with approximately 81,032 acres of acquired public lands located in the Fort Rock and Warner Valley areas. The resource area

also manages an additional 121,000 acres of reserved Federal minerals (no surface ownership) (Map M-1 of the Draft RMP/EIS).

The majority of the resource area consists of solidly-blocked public lands with the larger private land blocks occurring in the valleys where the land is more fertile and water is available for agricultural production. Rural home sites also occur throughout the agricultural areas with large State land blocks intermingled throughout.

Public/Private Land Interface

Generally, the LRA does not have a public/private land interface problem. There are situations throughout the resource area where public and private lands intermingle and create property boundaries which do not conform to logical natural topographic features. This occasionally complicates and increases management costs of such activities as prescribed burns, livestock grazing, and key wildlife habitat.

The “High Desert and Warner Lakes Management Framework Plans” (USDI-BLM 1983a, 1983b) identified approximately 250 acres of public land to be made available for urban-suburban expansion and public purposes. Presently, the resource area has transferred approximately 258 acres out of Federal ownership for this purpose.

Land Use Classifications/Recreation and Public Purposes Act

The resource area has one existing land use classification for the Sunstone Collection Area (2,500 acres); no applications are pending which would require new classifications. Historically, the majority of the resource area was under a classification for multiple use. The “High Desert and Warner Lakes Management Framework Plans” specifically identified the need for four recreation and public purpose leases—three for county sanitary landfill sites and one for civil defense purposes. To date, all these classifications have been terminated because the classifications were no longer necessary or the land has been disposed.

Lands Identified for Disposal

The “High Desert, Warner Lakes, and Lost River Management Framework Plans” (USDI-BLM 1983a, 1983b, 1983c) identified approximately 52,425 acres of public land for disposal, pending site-specific environmental analysis and soil and water studies (Map L-1 of the Draft RMP/EIS). If the parcels are found suitable

for disposal, a land classification would be issued that states this information (refer to Appendix O1 of the Draft RMP/EIS for the criteria governing land tenure adjustments). Presently, the LRA has disposed of approximately 8,040 acres of those lands identified. Refer to Map L-1 of the Draft RMP/EIS and Table O2-1, Appendix O2, Alternative A, for the legal descriptions of those public lands remaining available for disposal.

Typically, under the present planning system, land exchanges are evaluated for plan conformance and viability on a case-by-case basis. The “Warner Lakes Management Framework Plan” (USDI-BLM 1983a) did identify the need to complete the North Warner State (Oregon) Exchange. However, since the acreage was unknown at the time, the plan did not specifically identify the acreage involved. To date, the LRA has completed five exchanges, totaling approximately 21,300 acres.

Lands Identified for Acquisition

To date, acquisition of non-Federal lands by the LRA has been considered only in the “Warner Lakes Plan Amendment for Wetlands and Associated Uplands” (USDI-BLM 1989b, 1990b, 1990d). The plan amendment specified that private lands within the designated wetlands area would be acquired only through voluntary willing sellers or exchange proponents, as opportunities arose. Since implementation of the plan amendment, the LRA has successfully acquired approximately 10,340 acres within the Warner Wetlands.

Access (Easement) Acquisition

Currently, access to public land in the LRA has not been a significant problem, since physical access is readily available to most areas. However, there are several hundred locations throughout the LRA, representing possibly thousands of individual easements, where legal access rights could be acquired. Generally, the LRA pursues easement acquisition on a case-by-case basis as determined by necessity.

Unauthorized Occupancy and Use

Unauthorized occupancy and use is not a significant problem in the LRA. Unauthorized occupancies are typically encroachments of buildings or yards onto public land and have usually existed for many years. These situations are most often discovered in the course of surveying projects. Unauthorized agricultural uses typically involve the encroachment onto small areas of public land from agricultural operations

on adjoining private land; unauthorized right-of-way situations generally involve negligence. Resolution of such situations depend upon individual circumstances and may include issuance of temporary land use permits, leases or rights-of-way, disposal of the land either by sale or exchange, or removal of the unauthorized use.

To date, all of the 24 unauthorized use situations identified in existing land use plans have been reviewed. All but three have been resolved. Many of the unauthorized uses involved fenced Federal range. Fenced Federal range results when small portions of Federal land are within fenced private lands. These were resolved by adjusting the grazing permits of those applicable permittees. Several of these fenced Federal range situations, although technically authorized, have been identified for disposal in order to effect permanent resolution. Additional unauthorized uses are expected to be discovered periodically as the new surveys, field inspections, and public observations continue throughout the resource area. See Table 2-56 for the legal descriptions of fenced Federal range sale situations.

Temporary Authorizations

There are, at any particular time, approximately three to five temporary land use permits in effect that authorize such activities as trespass prior to resolution, access, hay storage, apiary sites, national guard or military reserve training, engineering feasibility studies, and other miscellaneous short-term activities.

Withdrawals

A withdrawal is a formal action that accomplishes one or more of the following actions:

- Transfers total or partial jurisdiction of Federal land between Federal agencies.
- Segregates (closes) Federal land to some or all of the public land laws and/or mineral laws.
- Dedicates land for a specific public purpose.

There are three major categories of formal withdrawals: (1) congressional withdrawals, (2) administrative withdrawals, and (3) "Federal Power Act" or Federal Energy Regulatory Commission (FERC) withdrawals.

1) *Congressional withdrawals*: are legislative withdrawals made by Congress in the form of public laws

(acts of Congress).

2) *Administrative withdrawals*: are made by the President, Secretary of the Interior, or other authorized officers of the executive branch of the Federal government.

3) *"Federal Power Act" or FERC withdrawals*: are power project withdrawals established under the authority of the "Federal Power Act" of 1920. Such withdrawals are automatically created upon filing an application for a hydroelectric power development project with FERC.

The LRA contains 12 existing withdrawals. Table 2-57 lists the existing withdrawals along with the authority, location, acreage, purpose, segregative effect, and surface management agency (Map M-2 of the Draft RMP/EIS).

The LRA has two Power Site Reserves (numbers 265 and 429) located within the Deep Creek Watershed, along Deep Creek and/or its tributaries. In the early 1990s, two applications were filed with FERC for possible pumped storage development at Lake Abert. The applications were subsequently withdrawn. Although hydropower development potential in the LRA is considered low, it may be feasible with today's technology and under current energy market conditions. The LRA will consider future proposals for hydropower development as they arise.

Rights-of-way

There are six major right-of-way corridors presently traversing the LRA. Three of the corridors contain large (500+ kilovolt) power transmission lines, one running east-west, north of Summer Lake and south of Christmas Valley, Oregon; a second north-south corridor traverses east of Fort Rock and Silver Lake, Oregon; and a third corridor running north-south, east of Christmas Valley and west of Adel, Oregon. The remaining three corridors are occupied by State Highways 31 and 140 and U.S. Highway 395 (Map L-2 of the Draft RMP/EIS).

The existing management framework plans identify several right-of-way exclusion and avoidance areas (Map L-2 of the Draft RMP/EIS). The future upgrading of existing transmission lines is likely and may require additional right-of-way width. Existing communication sites are listed in Table 2-58. All, with some restrictions, have the potential for future expansion; the Mahogany Mountain site is currently unoccupied. Demand for additional communications capabilities

Table 2-56.—Fenced Federal range disposal opportunities

Parcel	Legal description	Acreage
Agriculture	T.40S., R.20E., W.M., Oregon Section 8: NW¼NE¼.	40
Ditch	T.40S., R.20E., W.M., Oregon Section 24: W½SW¼.	10
Thousand Springs Ranch	T.30S., R.17E., W.M., Oregon Section 24: W½SE¼.	80
	T.30S., R. 18E., W.M., Oregon Section 18: Lot 4;	40.75
	19: Lot 2.	40.85
Paulina Marsh	T.28S., R.14E., W.M., Oregon Section 3: Lot 4;	40.25
	4: Lot 1.	40.26
	T.28S., R.15E., W.M., Oregon Section 17: SW¼NE¼.	40
Oatman Flat	T.27S., R.13E., W.M., Oregon Section 34: SW¼NE¼, NW¼SE¼.	80
Church Ranch	T.28S., R.16E., W.M., Oregon Section 15: W½SW¼;	80
	21: NW¼NW¼.	40
Vaughn Ranch	T.28S., R.15E., W.M., Oregon Section 11: NW¼SE¼;	40
	12: NW¼SW¼, SW¼SE¼;	80
	14: NW¼NE¼, S½NW¼;	120
	15: NE¼SE¼.	40
Main Ranch	T.27S., R.18E., W.M., Oregon Section 13: W½SW¼.	80
	T.27S., R.19E., W.M., Oregon Section 7: Lot 3, E½SW¼;	120.76
	29: SW¼SW¼;	40
	30: SW¼NE¼, SE¼NE¼, E½SW¼, W½SE¼, SE¼SE¼;	280
	31: NE¼;	160
	32: E½E½, W½W½, SE¼SW¼;	360
	33: W½W½, SE¼SW¼.	200

Table 2-57.—Existing withdrawals

Authority ¹	Location			Acres ²	Purpose	Segre- gative effect ³	Surface manage- ment agency
	Township	Range	Section				
E.O. 4/17/1926	30	23	25	40	Public Water Reserve 107	A	BLM
	32	23	14	40			
	36	22	7	40			
	38	24	31	10			
	40	23	28	30			
	40	29	6	29.63			
			7	80			
	40	28	1	20			
	41	24	21	2.5			
			22	2.5			
			Subtotal	294.63			
E.O. 1/24/1914	31	27	7	80	Public Water Reserve 15	A	BLM
	38	25	29	260.32			
	23	19	10	160			
	26	18	29	39.31			
			32	4.82			
			33	96.02			
	26	19	8	120			
			17	40			
	26	20	6	60.29			
			Subtotal	860.76			
E.O. 6/13/1925	38	23	29	40	Public Water Reserve 91	A	BLM
	40	23	7	14.45			
			18	64.97			
			Subtotal	119.42			
E.O. 5/8/1930	38	23	29	80	Public Water Reserve 131	A	BLM
			32	120			
			Subtotal	200			
E.O. 2/25/1919	40	22	10	100	Public Water Reserve 61	A	BLM
			25	40			
			Subtotal	140			

Authority ¹	Location			Acres ²	Purpose	Segre- gative effect ³	Surface manage- ment agency
	Township	Range	Section				
E.O. 4/29/1912	40	22	8	40	Power Site Res. 265	C	BLM
			9	40			
			Subtotal	80			
E.O. 4/3/1914	39	22	25	80	Power Site Res. 429	C	BLM
	39	23	19	129.27			
			30	135.63			
			Subtotal	344.90			
SO 9/8/1910	28	14	21	80	Administrative site	B	USFS
			28	80			
			Subtotal	160			
PLO-5235 7/14/72	25	20	20	8,960	Research natural area	B	BLM
			21				
			22				
			23				
			24				
			25				
			26				
			27				
			28				
			29				
			30				
			31				
			32				
			33				
			34				
			35				
			36				
			Subtotal	8,960			
PLO-6745 8/28/89	26	20	19	2,622	Radar site	B	USAF
			30				
			31				
			32				
	27	20	5				
			6				
			Subtotal	2,622			

Authority ¹	Location			Acres ²	Purpose	Segre- gative effect ³	Surface manage- ment agency
	Township	Range	Section				
PLO 300 10/25/1945	30	16	13	7,127.65	Wildlife reserve	B	BLM
			24				
			25				
			36				
		17	17				
			18				
			19				
			21				
			28				
			29				
			30				
			31				
			32				
			33				
	31	16	1				
	31	17	4				
			5				
			6				
			7				
			8				
			9				
			Subtotal				
PLO 7446 5/18/00			33	18	11	80	Seed orchard
Resource area total				20,989.36			

¹ Authority abbreviations: E.O. = Executive order; S.O. = Secretarial order; PLO = Public land order.

² Table does not include lands that have been transferred out of Federal ownership subsequent to withdrawal.

³ Segregative effect: A = withdrawn from operation of the general land laws and closed to nonmetalliferous mining (cement quality limestone, diatomite etc.), but open to metal mining (gold, silver, and mercury etc.). B = withdrawn from operation of the general land laws and the mining laws. C = withdrawn from the general land laws.

ties is expected to result in requests to establish new sites in the future.

The “Western Regional Corridor Study” has identified one potential east-west corridor (the south corridor) which traverses the LRA south of the Hart Mountain National Antelope Refuge. This particular corridor is currently unoccupied and has been eliminated from consideration as a corridor in both the Lakeview District’s, Klamath Falls RMP and the Southeastern Oregon RMP. Since the corridor is not recognized on either the east or west sides of the LRA, the south corridor will not receive further consideration in this RMP.

Roads/Transportation

Approximately 2,500 miles of roads are on the LRA road inventory. However, based on the number of roads shown on USGS maps and aerial photographs, it is estimated that another 2,500 miles of roads, trails, and ways not on the inventory also exist on the public land. These roads are used by BLM personnel for administrative access, by ranchers and other permittees, and by the general public seeking recreation opportunities.

In an effort to assist in setting priorities for future watershed and road analyses, road density classes were computed by watershed for all watersheds within the four main subbasins within the planning area. Existing road data was classified in accordance with road density classes defined by the ICBEMP. Almost all of the planning area is in the very low to medium road density class. Very low road density is 0.02 to 0.10 miles of road per square mile of land; low road density is 0.11 to 0.70 miles per square mile; and medium is 0.71 to 1.70 miles per square mile. About 2,000 acres

in the northwest corner of the planning area are classified in the high road density. High density is 1.70 to 4.70 miles per square mile. This information is displayed on Map R-4 of the Draft RMP/EIS.

The resource area maintains approximately 100 miles of roads each year. Roads are maintained at various levels, depending on maintenance needs, funding, and the need for the road. The assigned maintenance level reflects the need for the road and appropriate maintenance that best fits the transportation management objectives. Roads are prioritized for maintenance needs as follows.

Level 1: This level is assigned to roads where minimum maintenance is required to protect adjacent lands and resource values. These roads are no longer needed and are closed to traffic. The objective is to remove these roads from the transportation system. Emphasis is on maintaining drainage and runoff patterns as needed to protect adjacent lands. Grading, brushing, or slide removal is not performed unless roadbed drainage is being adversely affected, causing erosion. Currently, there are no Level 1 roads on the resource area’s transportation plan (USDI-BLM 2000e).

Level 2: This level is assigned to roads where the management objectives require the road to be open for limited administrative traffic. Typically, high-clearance vehicles are necessary for passage. Grading is conducted as necessary to correct drainage problems. Brushing is done to allow administrative access. Approximately 1,600 miles of Level 2 roads are on the transportation plan.

Level 3: This level is assigned to roads that need to be open seasonally or year-round for commercial, recreation, or high volume administrative access. Generally, these roads are natural- or aggregate-surfaced, but may

Table 2-58.—Existing communication sites

Communication site	Legal description
Mahogany Mountain	T.29S., R.14E., W.M., Oregon Section 15: SE¼.
Table Rock	T.28S., R.15E., W.M., Oregon Section 12: NW¼.
Paisley	T.34S., R.20E., W.M., Oregon Section 16: Lot 1, NE¼NW¼.
Coyote Hills	T.35S., R.22E., W.M., Oregon Section 11: NE¼.
Plush	T.38S., R.24E., W.M., Oregon Section 4: NE¼.
Fish Creek Rim	T.39S., R.24E., W.M., Oregon Section 17: NW¼.

include low-use asphalt-surfaced roads. These roads have a defined cross section with drainage structures such as dips, culverts, or ditches. These roads may be used by passenger cars traveling at a reasonable speed. Drainage structures are inspected at least annually and maintained as needed. Grading is done to provide a reasonable level of comfort and safety. Shoulder brushing is done to improve sight distance. Any obstructions affecting drainage are a high priority for removal. At the present time, approximately 550 miles of Level 3 roads are on the transportation plan.

Level 4: This level is assigned to roads that management direction requires to be open all year, unless they are closed or have limited access due to snow conditions. These roads connect major administrative facilities such as recreation sites, local road systems, or administrative sites to county, state, or Federal roads. They may be single or double lane, aggregate or asphalt surface, with a higher volume of commercial and recreational traffic than administrative (BLM or permittees) traffic. These roads are maintained annually if possible. However, because of annual road maintenance funding limitations in the District, not all Level 4 roads are maintained each year. A total of 385 miles of Level 4 roads are currently on the transportation plan.

Level 5: This level is assigned to roads that need to be open all year and are the highest traffic volume on the transportation system. These roads may be closed or have limited access due to snow conditions. The entire roadway is maintained at least annually. There are no Level 5 roads on the resource area's transportation plan.

New roads may be constructed by BLM or by a permittee in connection with a project such as mineral development or a rights-of-way. In the past 10 years, no new roads have been constructed. However, approximately 6 to 8 miles of new trails have been developed in connection with the development of wells, pipelines, and fences. These ways have not been constructed with heavy equipment but have resulted from the passage of vehicles.

Hazardous Materials

Introduction

All incidences of hazardous materials on public land are handled as outlined in the Lakeview District's contingency plan (USDI-BLM 2001f). All actions related to land or minerals are reviewed both internally

and externally (if appropriate) for compliance with Federal and state regulations. Special stipulations are also developed as part of the permit or lease to safeguard human health, prevent environmental damage, and limit BLM liability.

The hazardous materials program will be managed in the same general manner in all alternatives in accordance with current laws, policies, and regulations. Consequently, the hazardous materials program will not be addressed further.

Existing Conditions

Alkali Lake Chemical Waste Disposal Area

The 10.3-acre storage site in Lake County, Oregon, is owned, operated, and monitored by the ODEQ. The Alkali Lake Chemical Waste Disposal Area was the storage site for about 25,000 55-gallon drums of distillation residue from the manufacturing of herbicide during 1967 to 1971. During studies that were done in the 1970s and 1980s, hazardous substances such as chlorophenoxyphenols, chlorinated phenols, chlorinated dibenzodioxins, and chlorinated dibenzofurans were found in the soil and groundwater near the Alkali Lake Chemical Waste Disposal Area. The contaminants have been transported offsite by wind and water.

In 1990, the BLM and ODEQ took additional steps to protect the public by fencing the area of known groundwater contamination in West Alkali Lake. This site was part of the EPA's national dioxin study in 1984, but no risk assessment was performed at that time. The BLM considered potential ACEC designation for public lands surrounding the site, but it was determined that those lands were not suitable for ACEC designation (see Appendix I of the Draft RMP/EIS).

Land surrounding the Alkali Lake Chemical Waste Disposal Area is public land that is open to multi-resource activities such as cattle grazing, hunting, hiking, and recreation. As of spring 1998, a groundwater contamination plume was detected on this public land 1,500 feet west of the fenced disposal area. Besides the contamination of groundwater, another potential impact is to the Hutton tui chub, a fish species on the USFWS threatened or endangered list.

Unexploded Ordnance on Public Lands

Often public lands are used for military training grounds. Central Oregon was a major training area during World War II. Unexploded ordnance have been found on the LRA. Currently the resource area is still

used as a training route for military aircraft, and live-fire exercise were conducted. Today many unexploded ordnance are surfacing in these training areas. Many World War II items are collectibles and are dangerous to public safety. Other forms of hazards can and do occur within the training areas. These included hazardous and toxic substances and radioactivity, including unexploded ordnance from downed aircraft and other sources.

Alkali Lake aerial targets are located north of the Chemical Waste Disposal Area. These mounds are known to have been used as aerial live-fire targets. The targets were constructed of native sand pushed up into mounds 30 to 40 feet high. Aircraft would live-fire 50 and 20 millimeter rounds and practice bombs into the mounds. In most cases, practice munitions are armed and dangerous.

The U.S. Army Corps of Engineers is mandated under the Defense Environmental Restoration Program to the remediation of all formerly used defense sites. Additionally, all projects under the program must be in compliance with the "National Historic Preservation Act." All unexploded ordnance found will be disposed of in coordination with Explosive Ordnance Disposal/Army Team at Fort Lewis, Washington.